

The Commercial Car Journal

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Motor Truck in the Furniture Industry The Furniture City Was Slow in Adopting Motor Delivery, But Has Made Up for Lost Time

By C. W. SHAFER

THE FURNITURE manufacturers at Grand Rapids, Mich., were tardy in accepting motor transportation as an institution. They held back for several years, in fact, the oldest truck in service in the Furniture City's furniture trade is only a little over five years of age. With their adoption, however, the worth of the vehicles became instantly apparent and every one of the numerous factories now uses from one to five trucks. Arguments for this worth are numerous and they are readily understood when the experiences of George Dakin, superintendent of the Grand Rapids Showcase Co., are taken into consideration.

This company purchased a 2-ton Republic truck about four years ago and last June replaced it with another Republic of the same tonnage. In February, this year, a second 2-ton Republic was added. All through the time of operation Mr. Dakin knew he was getting results because he was able to dispense with four teams, but not until April of this year did he tabulate the actual expenses and maintenance cost for a comparison with horse-drawn equipment.

Expense of Truck No. 1 (Old)
Gasoline (120½ gals. @ 19½c.) \$23.50
Oil (11 qts. @ 9c.)99
Driver's wage (\$20 the week) 66.67
Depreciation (basis, \$500 a year) 41.67
License 2.00
Insurance 5.00
Total \$139.83

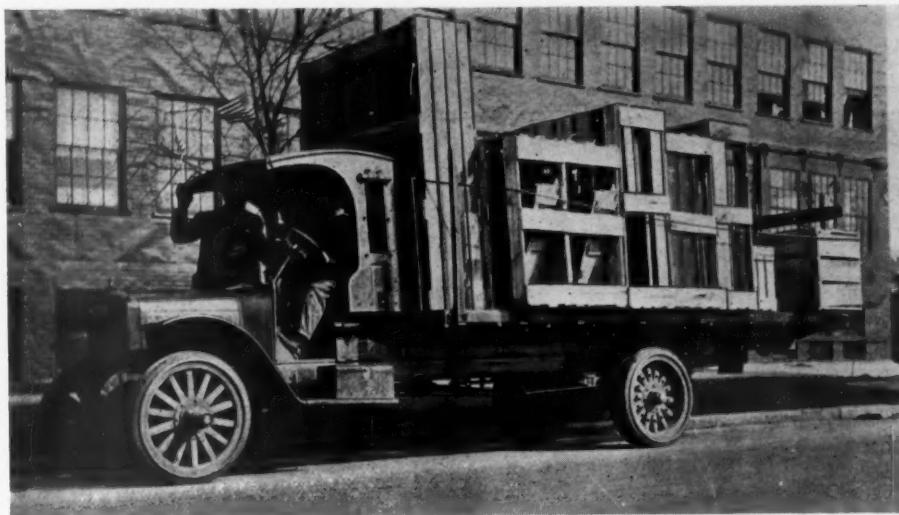
Expense of Truck No. 2 (New)
Gasoline (166½ gals. @ 19½c.) \$32.47
Oil (19 gals. @ 9c.) 1.71
Driver's wage (\$20 the week) 66.67
Depreciation (\$500 the year) 41.67
License 2.00
Insurance 5.00
Total \$149.52

Expense of One Team
Teamster (\$13.50 week) \$54.25
Feed (\$1 per day per team) .. 30.00
Depreciation on horses 3.33
Depreciation on wagons 1.50
Shoeing 5.00
Harness 2.00
Risk on horses 5.00
Total \$101.08
Total for four teams \$404.32
Total for trucks (\$139.83 + \$149.52) \$289.35
Difference in favor of trucks \$115.97

In making these computations Mr. Dakin was fair in every instance. He placed the salaries of his drivers at \$16 when he was forced, before the month was up, to raise their wages to \$18. His allowance for depreciation on the trucks at \$500 a year was very liberal, while, on the other hand, his depreciation on the horses and wagons, together with the costs of repairs, were modest. And, in taking the risk on his horses into consideration, he felt justified because, as he argues, a horse is as liable to accident as a truck and if its leg is broken it is gone for all time, while a truck may always be repaired. His figures were more

it is figured that the two machines will save fully \$2500 during 1917.

During the recent car shortage troubles the Grand Rapids Showcase Co., has especially appreciated the value of motor trucks. For several weeks it was necessary to employ teams to haul incoming freight from the downtown station to the warehouses. The motor trucks were used nearly all of the time on outgoing business, but occasionally were switched to duty with the teams. On these occasions when the truck and team would leave the station together the truck would make the trip to the warehouse and be half-way back on a



Two-Ton Republic Working for the Grand Rapids Showcase Company

than satisfactory and his attitude now is that he would purchase another truck if he could see enough business ahead to keep it busy.

It is not in regard to comparative expense alone that Mr. Dakin figures the value of the trucks. On the basis of tonnage moved he figured that, during the month of April, his two trucks moved more merchandise than 5 teams would have moved, besides getting nearly 50 per cent. more mileage. The company has very long hauls from the factory to the loading depots in the city and on every trip a great deal of money is saved. During 1916 the older truck registered a saving of \$1800 (approximate) and

return trip before meeting the team. In every instance the truck would operate in a ratio of 5 to 2 over the team.

Mr. Dakin's final argument for his trucks has to do with a matter of minor importance, but one which is particularly significant. The company maintains a warehouse for hardware used in manufacture about two blocks distant from the main plant. This hardware is moved only as required and, in the days of the horse-drawn vehicles, it was allowed to accumulate until a full load was achieved. Then a team would be dispatched to remove it. Now the trucks slip up to the warehouse between trips and take on the pieces as fast as they are needed. This utility of the truck alone,

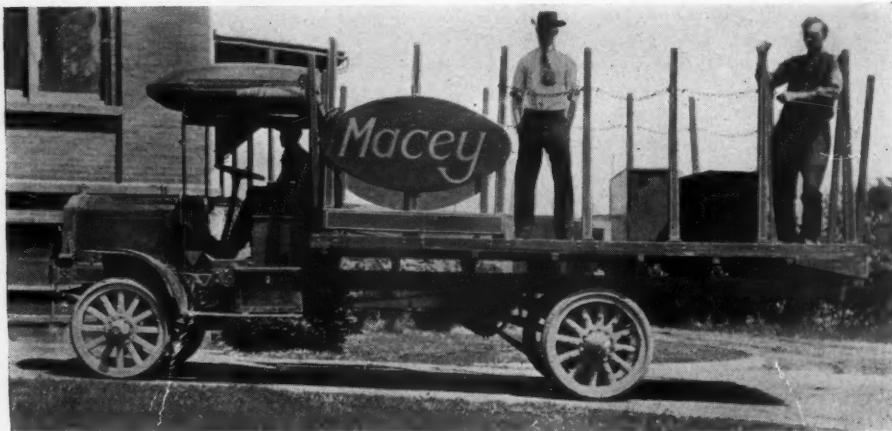
Mr. Dakin says, is enough to keep him "sold" to motor delivery for all time.

The Macey Co., of Grand Rapids, is one of the largest producers of metal furniture in the world. The plant is located a considerable distance from the main freight depots and a 3-ton Packard truck is used in transportation.

During three years of service this truck has saved the company 27 per cent., this figure being computed on a basis compared with horse-drawn vehicles. Until the truck's

the Young & Chaffee Furniture Co., at Grand Rapids, Mich. The company uses a Studebaker, an Independent, a Republic 3-ton and a Ford service wagon. With these cars a four-times-a-day delivery service is maintained in all sections of the city. Previously, with horse-drawn vehicles, but two trips a day over the company routes were possible. Each truck makes from 40 to 100 miles a day.

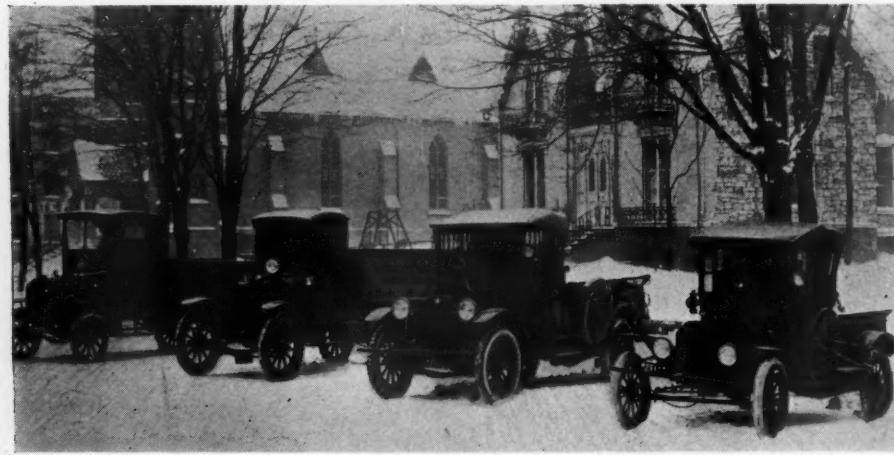
This one feature alone is a sufficient guarantee of the truck values, but the cost



The Macey Company is Connected With the Distant Freight Depot by This Three-Ton Packard

appearance the company contracted for all haulage, paying \$110 a month no matter how much freight was moved. The services of six teams were required every day and frequently ten teams were used. Now the truck does all this hauling. It has averaged 23 miles a day during the three years at a cost of 4.5 cents a mile for gasoline, and 18.5 cents a mile for driver, gasoline and oil, combined. Its average cost has been \$75 a month and it has been put

of operation is another argument. The company once owned twelve horses and used six light rigs in delivering. A large barn was maintained with two regular men on duty to care for the horses. The average salary of the drivers and barn men was \$13 a week—a total expense of \$78. Feed and incidental expenses for the horses averaged \$240 a month. This gave a total expense, not figuring depreciation, insurance, etc., of \$552 a month. With the adop-



A Fleet in the Retail Furniture Business of the Young & Chaffee Furniture Company
These cars maintain a four-times-a-day delivery service in all sections of Grand Rapids

up for repairs only once. The truck is essentially a part of the Macey Co.'s business and it will always be so, according to officials of the company. It has demonstrated its value so thoroughly that it could not be replaced.

In the retail furniture business the motor truck has proved to be equally as valuable as in the manufacturing end. This is strikingly evidenced by the trucks operated by

tion of motors the horses were sold (yielding sufficient money to purchase one truck) and the barn was converted into a garage. Drivers were hired at a salary of \$18 a week and each driver was his own repairman. Considering gasoline, oil and tires, the average expense for a month with the trucks was \$105 or a total expense for the four machines of \$420, leaving a balance in favor of the trucks of \$132.

At present the chief value of the trucks is in handling out-of-the-city business. Previously orders from the small towns within a radius of 30 miles of Grand Rapids could be reached by interurban, rail or by wagon. If the interurban or railroad was used it was necessary to crate all furniture and the cost of crating a load averaged around \$12. If a wagon was used the delivery was slow and the expense had to be checked against an entire day. Now one of the company's big trucks cares for all of this outside business. It is specially upholstered and crating is unnecessary. Besides from two to six and eight deliveries can be made every day. With the lessened expense the company is able to make special prices to outside trade and, as a consequence, has increased its business materially.

Trucks Valuable at Show Time

Twice a year, during January and June, Grand Rapids, Mich., has a furniture show. Huge buildings in the heart of the city are filled with exhibitions and furniture valued at more than \$10,000,000 is on display. Approximately 2000 cars are unloaded every season.

Four years ago practically all the transportation of this enormous amount of furniture was done with horse-drawn vehicles. Transfer companies used every horse available in the city, commandeering every sort of a vehicle, from a buck-board up to a moving van. This year the order was changed, the change coming through a gradual process of substitution, and but



Unloading a Truck Load of Furniture at a Big Exhibition Building

a small part of the shipments was moved with horses. Motor trucks did the work.

And these motor trucks have changed the entire aspect of the furniture situation. It once required the better part of two weeks to do this unloading. This year the big exposition buildings were filled in a week. One 5-ton truck of the Elston Packing & Storage Co. moved 92 loads, an average of nearly 14 a day. It would have been considered very good in the old days if a team moved five loads. The ease of loading, the facility in unloading, the rapidity of hauling, all counted as features. And moreover, with the trucks, the percentage of breakage and damage in hand-

ing was cut more than 100 per cent. Formerly the wagons were loaded far above capacity and consequently many dangerous situations arose. Now the trucks have ample capacity and overloads are not necessary. The resultant insurance is valuable.

Trucks have been a revelation in the furniture market of Grand Rapids. Although a few horses were used this year, it is expected they will be entirely eliminated by 1918. The few transfer companies using horses had hard work to secure moving contracts this year. Every manufacturer wanted the trucks, and the moving companies with trucks were fairly besieged with demands for contracts. It was only when the necessity for moving became imperative, and all available trucks were in use, that the manufacturers reluctantly consented to the use of the horse-drawn rigs.

W. C. Wood Co. has moved from 50 N. 10th St. to 74 Western Ave., Minneapolis, Minn.

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio, has announced the following changes in branch managers: B. S. Waterman, formerly branch manager at Boston, Mass., has been placed in charge of the solicitation of manufacturers' business in all departments for the New England district. C. B. Peschmann, formerly in charge of the Goodyear Sales School at Akron, becomes manager of the Boston branch. K. H. Dresser, formerly manager of the Springfield, Mass., branch, was transferred to Akron, and succeeded by R. E. Lane. Edward Lingenfelder, manager of the Los Angeles branch, has resigned to go into business for himself as a tire dealer. Geo. Bellis has advanced from the position of manager at Sacramento, to manager at Los Angeles, succeeding Lingenfelder. C. B. Reynolds, formerly manager, Tacoma, Wash., is now manager at Sacramento. A. E. Patterson, former salesman in the Portland, Ore., branch, is now manager at Tacoma, Wash.

THE SERVICE OF AN ACASON DISTRIBUTOR

"Complete service" seems to be the motto with Beach & Foreman, Detroit distributors of Acason trucks, who operate in conjunction with the Acason factory in that city. Some two years ago the firm decided to specialize in trucks by catering to a certain class of trade. After a careful survey of the situation, it was agreed that the cartage field appeared the most promising. Then came a thorough investigation to determine the requirements in this direction, and incorporate all of them in a single truck that would fit into the business in a manner calculated to give maximum satisfaction. The result is a 3½-ton truck so complete in every detail that all the purchaser has to do is buy his license plates, everything else being furnished, even to fire and accident insurance, for a period of two years.

The manner in which this specialization has been worked out furnishes some valuable pointers on the possibilities in this direction. Oversized tires are used on the rear wheels—6 in. dual instead of the regular 5 in., it having been demonstrated that the extra mileage more than covers the additional cost. A trailer attachment is placed on every cartage truck sold in Detroit, so that it is possible to tow a disabled machine without danger of breaking a spring or straining an axle.

To guard against the harm that might come from an unevenly distributed load, as in the case of a piece of heavy machinery that may not be kept in the center of the chassis, the frame is reinforced with truss rods. Extra heavy rear springs also are used to keep the load steady when the going is rough. The body is built of high-grade oak, but in this job the sides are of extra heavy angle iron, with rope hooks and skid irons on the side, and the platform liberally reinforced with iron strips. Under the platform is built a wooden box that carries the tarpaulin cover when not

in use, and other things, such as rope and tackle. Even an electric spotlight is regular equipment.

Perhaps the most interesting feature of the plan is the fire and accident insurance which accompanies every truck sold in Detroit, this feature, as well as the others enumerated, being only local in its application. Formerly it was the practice of Beach & Foreman to insure for one year only. Now the term has been raised to two years because of the favor with which the plan met, and the discovery that conditions warranted such an extension.

"One of the first things we discovered when we began selling trucks was that the purchaser was inclined to put off taking out insurance," said Mr. Foreman, in discussing this phase of the service rendered. "A man might drive a truck away in the morning and have a smashup that afternoon, or at least before he got around to have the truck insured. Then he would be confronted by a repair bill that, however modest it might be, was discouraging, right at the outset. If he dodged trouble he would put off taking out insurance until something happened."

Blanket Insurance Solved the Problem

"To eliminate this trouble we made arrangements for blanket insurance, and every truck that goes to a Detroit cartage man is insured for two years—that is, save in rare instances, where a big concern carries its own insurance, in which event we make an allowance on the purchase price. But those cases are infrequent because the value of insurance is recognized, and we can secure a better rate on a wholesale basis than an individual could. So we just include it in the purchase price."

"This plan has proved of great value to cartage men because no unnecessary time is lost. In the ordinary run of events, if a truck that was insured suffered injury it would be a case of waiting until an adjuster could determine the damages that his company would pay, and then running the truck into the shop for repairs. Our arrangement is such that repairs are started whether the adjuster has seen the truck or not. All replacements are accounted for, and the truck is turned out in the shortest possible time, the adjustment of insurance often taking place after the truck is back in service. This means that the truck which met with a mishap is out of commission just as a short a time as possible, and that the owner is relieved of any responsibility in the matter, as we handle all the details."

"It might be argued that this freedom from responsibility puts a premium on careless driving. That has not been our experience, for drivers as well as owners realize that the value of a truck lies in its steady operation, and they are just as careful as though they had to stand the loss direct."

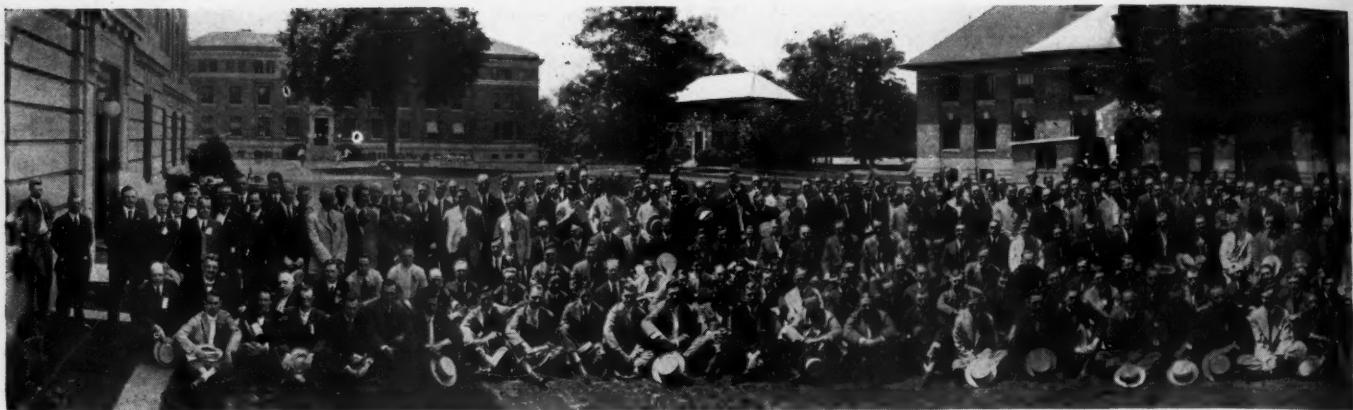
"The popularity of the features we have incorporated in the service which leaves nothing for the purchaser to buy except the license tags is reflected in the fact that although we cater exclusively to cartage men, the factory has not been able to keep up with the demands for trucks that come to us, a very large percentage of which are resales."



Dealer Displays Furniture Truck During Furniture Show

Taking advantage of the semi-annual influx of furniture dealers at Grand Rapids, Mich., the Republic Motor Truck Company, of Alma, constructed a special two-ton furniture truck and displayed it in the heart of the business district. The truck carried a heavy upholstered body, 6 ft. wide. Painted in white and striped with gold, it presented a very attractive appearance and gained some real business for the Grand Rapids dealer.

Why is the CCJ the only truck paper a member of the Audit Bureau of Circulations? Here's food for thought



Group of Those Attending the Meeting of the Standards Committee of the Society of

S. A. E. Summer Meeting

Marked by the Desire to Assist the Government in the War

IT was generally felt to be the appropriate thing this year for the Society of Automotive Engineers to depart from the previous years' custom of making the Summer meeting a joyous outing principally and to meet at Washington instead and concentrate in a short business-like meeting on subjects of concern to the Government in the most effective carrying on of the war.

To that end there were two days instead of the usual more extended meeting. The first day, June 25, was a meeting of the Standards Committee rather than that of the Society as a whole, although all members of the Society were invited to be present. The second day was, strictly speaking, the Society's convention and considered, in addition to the usual business and the Standards Committee report, presentation of papers relating to automotive equipment that figures in the conduct of war.



MAJOR WILLIAM G. WALL
Chief Engineer of the National Motor Vehicle Company, one of the many S.A.E. members now working for the Government.

The big event of the meeting was the dinner Tuesday night at the New Willard, at which there were about 700 in attendance, the largest gathering yet held by the Society, and the one most filled with significance probably as well as most inspiring.

Secretary of War, Newton D. Baker, made a powerful address outlining the position of the United States in the world war and clearly defining the purposes and ideals which determined the Nation's entering into the conflict and shall continue to guide its participation in the war. Also

this Board has done in its short existence (then less than two months). At eight universities cadet schools with 8-week courses on aviation and military tactics have been established. Four large aviation schools have been started, one each at Dayton, Chicago, St. Louis and Detroit. The original field of 80 acres used by the Wright brothers in their flying has been added to at Dayton, making a tract of 2500 acres where 3000 men are now being trained.

Following registration on Monday morning, the Standards Committee held its meeting in the Bureau of Standards auditorium and reports were received from the Aeronautic, Ball and Roller Bearings, Chain, Data Sheet, Electrical Equipment, Engine, Iron and Steel, Lighting, Marine Standards, Miscellaneous, Research, Starting Battery and Tire and Rim Divisions. There was also a short report from the newly created Tractor Division.



HON. WILLIAM C. REDFIELD
The Secretary of Commerce informally addressed the Standards Committee Meeting

of intense interest were the addresses of Wing Commander I. W. Seddon, of the English Aeronautic Division and Lieut. de la Grange of the French aeroplane forces.

Judge Benton Crisp, well known as the attorney who took such an active part in the releasing of the automobile trade from the Selden patent tax, was the toastmaster and was introduced by Pres. George W. Dunham, after the latter had opened the speaking part of the program with an address in which he called attention to the importance of the different activities now embraced in the Society's membership in the struggle in which the nation is now engaged.

Following Secretary Baker, Edward A. Deeds, of Dayton, O., chairman of the Airplane Construction Board of the Council of National Defense, spoke on the work



K. W. ZIMMERSCHIED
Chairman of the Iron and Steel and Nomenclature Divisions of the Standards Committee.



Automotive Engineers at the Bureau of Standards, Washington, D. C., June 25, 1917

The Aeronautic Division's report, presented by Chairman C. M. Manly, was one of the principal features and occupied most of the time, because it included an unusually large number of parts on which a great deal of work had been put by this division of the committee in the last few weeks and months in the hope of getting the advantage of standardization in time for the large program of airplane building contemplated by the Government within the next year and throughout the continuance of the war.

Some parts of this division's report, as well as those of the other divisions, had already been approved by the committee at the meeting May 25, at Cleveland, Ohio, and some had also been approved by the Council so that on the following day, when the general meeting of the Society was held, the various parts already approved by the committee and council were submitted for the Society's action.

On both days luncheon was served on the grounds of the Bureau of Standards and the sessions continued in the afternoon.

Tuesday morning the members convened again in the Bureau of Standards building. The business session was opened with the president's address as printed elsewhere in this issue and was followed by reports of the treasurer, membership committee, discussion of constitutional amendments, elec-

tion of members of the nominating committee and the report of the Standards committee. In the afternoon following luncheon, the papers were considered at the Professional Session.

The first of these, "Building Submarine Chasers by Standardized Methods," presented by Henry R. Sutphen, vice-president of the Elco Co. and Submarine Boat Corp., recounted the remarkable accom-

plishment of the latter company in building 550 vessels of the type that is now popularly known as submarine chasers, for the British Government, in an actual working schedule of 488 days, according to contract, boats being required to be delivered in complete running order by November 15, 1916, when the contract for the first fifty was signed April 9, 1915. Mr. Sutphen's paper was illustrated by motion pictures showing the rapidity with which the erection of the vessels was accomplished, which is the more remarkable as this is the first time shipbuilding of any character was undertaken on a really manufacturing basis.

The second paper, "The Farm Tractor as related to the Food Problem," was offered by H. L. Horning, general manager of the Waukesha Motor Co., and was quite a study of dietetics and food values working up to the part that tractors may play in providing the Nation with the kinds of food that are most beneficial.

The next two papers were by guests of the Society, the first being by Wing Comm. I. W. Seddon, of the Royal Naval (English) Air Service, and the title "The Design and Construction of Aircraft in War Time." Of the greatest value were the lessons brought to American engineers from the field where mistakes have been discovered and eliminated in airplane construction to a very large extent as the result of actual experience with their use in fighting and reconnoitering. Both this speaker and the one who followed, Lieut. Amoury de la Grange, of the French Commission, were accorded great applause and their remarks received with enthusiasm.



J. G. UTZ
Chairman of the Standards Committee
of the S. A. E.

plishment of the latter company in building 550 vessels of the type that is now popularly known as submarine chasers, for the British Government, in an actual working schedule of 488 days, according to con-



Some of the Notables at the S. A. E. Meeting

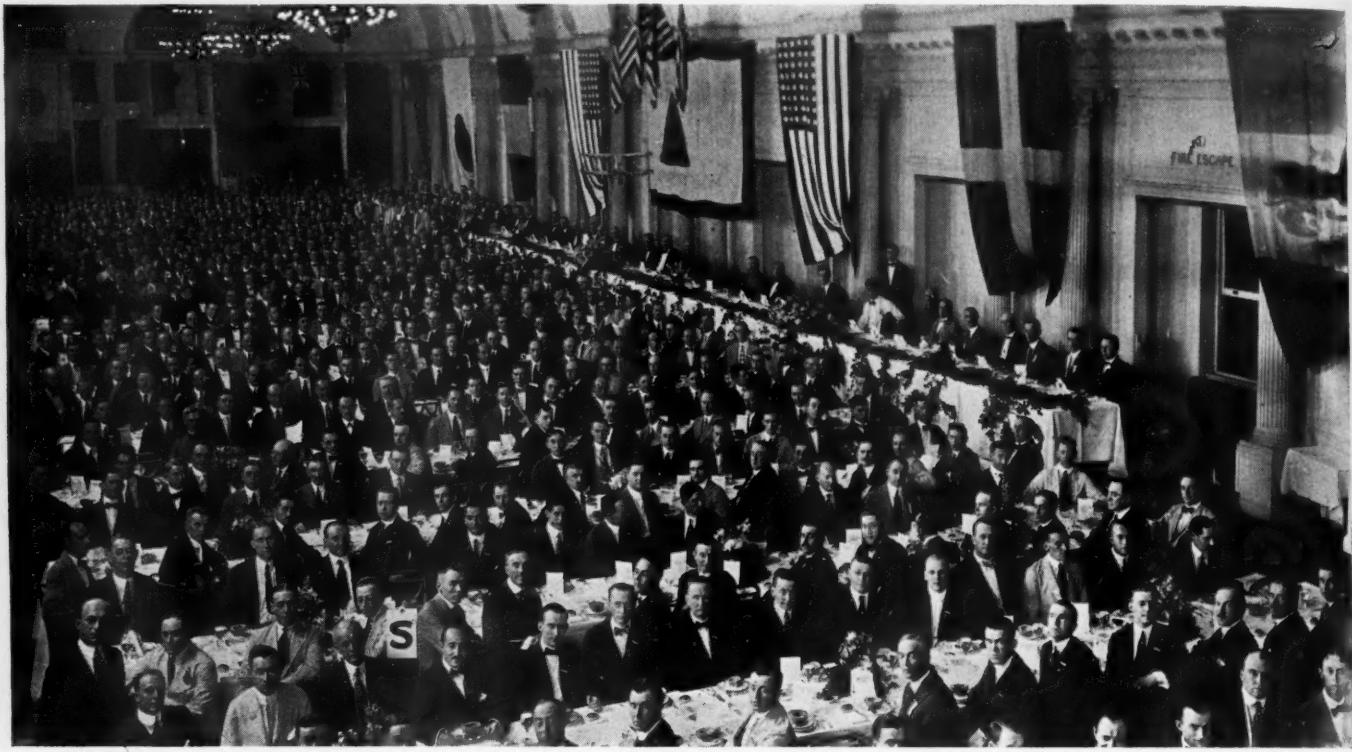
Left to right: Wing Commander I. W. Seddon, of the British aviation forces; Lieutenant Amoury de la Grange of the French aviation forces; H. L. Horning, Chairman of the Tractor Division of the Standards Committee; Henry R. Sutphen, author of paper on submarine chasers; George W. Dunham, President of the Society; Chas. M. Manly, Chairman of the Aeronautic Division of the Standards Committee.

Lieut. de la Grange spoke on the uses and classes of battle planes and made the text of his talk the necessity of airplanes to a successful and early consummation of the war. He considers that the greatest aid America can give the Allies' cause is in getting manned airplanes in the largest

possible quantity on the fighting front in the shortest possible time.

Two more papers were to have been presented, but the lateness of the hour caused them to be omitted as they had been printed in advance of the meeting. These were "Fundamentals of a Successful Kero-

sene Burning Tractor Engine," by C. E. Sargent, chief engineer of the Lyons-Atlas Co., extracts from which will be found in the Tractor Department in a later issue, and "Lessons of the War in Truck Design," by W. O. Thomas, consulting engineer, Detroit, Mich.*



Banquet of the Society of Automotive Engineers in the New Willard Hotel, Washington, D. C., June 26, 1917

UNITED STATES HAS MORE THAN 3,500,000 MOTOR CARS

According to the United States Department of Agriculture there were, in 1916, 1,067,332 or 43 per cent. more motor cars registered in this country than in 1915. The gross total of registered cars, including commercial cars, was 3,512,996. The several states collected in registration and license fees, including those of chauffeurs and operators, a total gross revenue of \$25,865,369.75. Of this amount 92 per cent., or \$23,910,811, was applied directly to construction, improvement or maintenance of the public roads in 43 States, according to figures compiled by the Office of Public Roads of the United States, Department of Agriculture, in Circular 73, "Automobile Registrations, Licenses and Revenues in the United States, 1916." The figures for 1916 correspond very closely with the annual percentage increase of motor-car registration of the last three years. This yearly increase has averaged 40 per cent. in the number of cars and 50 per cent. in revenues. When viewed over a period of years the increase in motor car registration and gross revenue has been remarkable. In 1906 the total State registrations were approximately 48,000 cars, on account of which the several States collected in fees and licenses a total gross revenue of about \$190,000. Only a small part of this was applied to road work. In 1916 the \$25,865,369.75 collected formed nearly 9 per cent. of the total rural road and bridge revenues of the States.

NATIONAL FORD ACCESSORY SHOW

Plans were recently laid for financing a national exposition of Ford accessories by a body of manufacturers, who will direct the shows throughout the country. H. V. Buelow, Toledo, O., has been made show manager and will have charge of the shows, the first of which will be held in Chicago in September. He has opened an office in the New Southern Hotel, Chicago.

SCRANTON MOTOR TRADES ASSOCIATION, Scranton, Pa., has been formed by automobile truck and accessory dealers, for the purpose of business discussions and good fellowship. M. J. Schmucker is president; H. Cassel, vice-president; Harold Conrad, secretary, and Douglas Lansing, treasurer. These officers, with Otto Conrad, F. W. Warner, D. J. Robinson, William Gardner and F. L. Smith form the directorate.

TUTHILL SPRING CO., Chicago, Ill., has recently posted a bulletin in its factory stating that the Government comes first, and must be supplied with springs, but that ways and means must be found not to sidetrack ordinary contracts or orders or general replacement business. By the elimination of wastes, the company expects to increase its capacity to meet the demands of its old customers and also those of the Government.

POLACK TYRE CO., New York City, has made the following appointments: G. H. Miller, manager of sales and advertising, with headquarters at New York Office, 1876 Broadway; William Domnich, representative at Pittsburgh, with office and service station at 2410 Penn Ave.; H. J. Kenney, manager of the New Haven Branch, with offices at 56 Ann St.; Carl Theodore Goldenberg, representative in the Virginia territory, with headquarters at 412 Cabell St., Lynchburg; Earl H. Pellet, manager of the Boston Branch, 531 Tremont St., and will also supervise the Providence territory; C. W. Smith, manager of the Washington territory, with office and service station at 34 Florida Ave.

DRIGGS-SEABURY ORDNANCE CO., of Sharon, Pa., has acquired all the property and assets of the Savage Arms Co., of Utica, N. Y., and has changed its name to the Savage Arms Corp. This change in no way affects the company's line of work.

F. A. SEIBERLING, president of the Good-year Tire & Rubber Co., Akron, O., at a hearing which the rubber manufacturers was given before the Senate Committee of Finance considering the War Revenue Bill, declared that there are 300 rubber manufacturers in this country and the volume of business in 1916 carried on by these companies amounted to \$600,000,000 of which \$250,000,000 was in tires alone. He stated that the rubber industry was ready to bear its just share of a uniform tax.

*See page 16a.

The S. A. E. in Government Service*

Importance of the Automotive Engineers to the Country in the Present War

By GEORGE W. DUNHAM

FOR many years the Society of Automotive Engineers has met each June to discuss technical papers, transact routine business, and renew old friendship by participating in affairs devoted to pleasure and entertainment.

We now come together in the first meeting of the Society of Automotive Engineers, not for pleasure or profit, because such a purpose would not be fitting in these times, but in order that we may, at the center of our National life, express our loyalty and allegiance as a Society and as individuals to our Government.

We come also that we may hear from prominent Government representatives and from authorities on the use of automotive apparatus in war, how we can fulfill our obligation to the nation most efficiently.

In these times we as automotive engineers have a duty to perform. Thousands of S. A. E. members have expressed their willingness to serve the nation, according to their ability and as may be determined by the Government.

Importance to Government of Society's Three Thousand Members

The members of the Society, three thousand strong, and comprising practically all of the leading automotive engineers of this country and many resident abroad, are experts in the design, building, operation and maintenance of all forms of automotive apparatus. Their experience, therefore, is such as to make them invaluable in virtually every activity connected with the prosecution of the war.

The work to be done by the S. A. E. members can be appreciated, when we think of the thousands of motor trucks for transporting food, supplies and ammunition to our own troops and to those of our allies; the motorcycles that will be required for dispatch riders and motor truck companies; the passenger cars that will be needed for transporting officers and for innumerable other purposes; the airplanes we must build for the training of thousands of aviators and for fighting at the front; the motorboats to be used for patrolling and averting the submarine menace; the tractors for moving field artillery; the farm tractors that must be built and put into efficient operation in order to feed the civilized world; and the many other power equipments that are necessary.

It is only a year ago that the proposal was made for the merger of the automobile, aeronautic, tractor and marine engineers. The wisdom of this idea was quickly seen by the members of the various societies concerned and as a result the Society of Automotive Engineers came into being on April 19 last. In addition, the National Gas Engine Association has voted that all its technical matters shall be taken

up through a committee of the S. A. E. and many of the engineers connected with the N. G. E. A. company members are joining this society.

The new and greater S. A. E. was formed that the Government might be able to deal with one engineering organization instead of several, and that automotive engineering might be more rapidly advanced through better co-operation. The society has been given many opportunities to serve the Government in the last few months, and because of the very nature of its activities, perhaps to a greater extent than any of the other national engineering societies.

Standards Committee Has Been Actively at Work

A great deal of this Governmental work has naturally been done through the Standards Committee of the Society, of which John G. Utz is chairman. The Truck Standards Division of this committee spent almost a year in the formulation of specifications for Class A and Class B military trucks. This work was carried on in conjunction with the Motor Transport Board of the War Department and with officers of the Quartermaster Corps. The completed specifications, which will be used in building the immense fleet of trucks necessary for the armies we will send abroad, are a great credit to the members of the Truck Standards Division and of the Electrical Equipment, the Springs, the Engine and the Transmission Divisions of the Standards Committee.

Other divisions of the Standards Committee have been in close touch with various departments of the Government. The Aeronautic Division has been working with the Aviation Section of the Signal Corps, and with the Navy Department in the standardization of detailed parts for airplanes. Although the aeronautic industry is comparatively new, much has been accomplished by this Division, and the work it is now doing is of such magnitude and importance that the Division should have the undivided support of all, even those not directly interested. The Tractor Standards Division has brought about a new era of co-operation among the engineers of the tractor industry, who are already enthusiastically taking up the work of standardization. The Division has also been in close touch with the U. S. Department of Agriculture in devising ways and means to increase food production. The Marine Standards Division has been most active in the standardization of parts in its field and much can be expected from it.

A large number of members of the Society have already entered the service of the Government and many more are ready immediately they are needed. It is noteworthy that six past-presidents of the Society are taking prominent parts in Government work. Past-President Riker is a

member of the Naval Consulting Board. Past-President Coffin, who did efficient work in connection with the Industrial Preparedness Committee of the Naval Consulting Board, is a member of the Advisory Commission of the Council of National Defense. He is also chairman of the Aircraft Production Board.

Past-President Souther is the senior officer of the Aircraft Engineering Division of the Aviation Section of the Signal Corps, with the rank of major. Past-President Marmon is doing engineering work with the Aircraft Engineering Division. Past-President Alden has been made a major in the Ordnance Officers' Reserve Corps. Past-President Vandervoort is acting as a member of the Munitions Subcommittee of the Council of National Defense.

Former Vice-President Zimmerschied is vice-chairman of the Automotive Transport Committee of the Council of National Defense. Former Vice-President William G. Wall is now a major in the Ordnance Officers' Reserve Corps. Vice-President Vincent has been doing work of the greatest importance in connection with aeronautic matters at the Bureau of Standards. The members of the Council are spending a considerable part of their time at Washington, and your president is the civilian member of the Board for Motorizing Field Artillery at the Bureau of Ordnance.

S. A. E. Opens Washington Office

The S. A. E. office, which has been established here in Washington, has kept in touch with the Government Departments, in order to be of service whenever possible. This service has been the supplying of names of men to act in various capacities and assisting the Government to make the best use of the resources of the Society. Many of our members will be required to do active duty of an engineering nature in the Government service. Others, however, and it is likely that these will form a large proportion, will serve best by remaining at home in their usual occupations, and by spending all their energy in the production of vehicles and apparatus to supply the needs of the war.

These members at home will naturally be able to assist in carrying on the general work of the Society. The war will require even more rapid development of the industry than has been the case previously. More work must be done by the divisions of the Standards Committee. Engineering development must go on and it will be necessary to present papers and discuss them in order to increase the efficiency for war purposes of all types of automotive apparatus.

To one familiar with the tractor industry the wonderful advancement from an engineering standpoint is obvious, but it must not be overlooked that the tractor is comparatively new and that it is going into hands unskilled in mechanical matters.

*Address of the president of the Society of Automotive Engineers, at the meeting in Washington, D. C., June 26, 1917.

There is great need of a strong movement to educate the consumer as to operation and maintenance, resulting in the elimination of much of the grief experienced in the early days of the automobile.

We are prone to look upon the motor car as closely approaching its ultimate form, but those of analytical mind realize that there is much yet to do in the way of simplification. When one stops to realize that in the average use of the average automobile, about a thousand pounds of car is required to the single passenger, one must admit that we are far from having solved the proper construction from the weight standpoint.

There has been a feeling that suitable engines for battle type airplanes cannot be produced in this country. What can be done elsewhere certainly can be accomplished here. It must be the prime effort of the aeronautic engineering members to make this condition a reality.

The motor truck engineers are to be congratulated on their accomplishments. Much may be done by the still further getting together of the truck manufacturers, the truck assemblers and those engaged in the manufacture of engines, transmissions, axles and other parts, that a greater uniformity of construction may result in a still better mechanism which can be produced to better advantage.

The various administrative committees of the Society have been of great assistance in carrying on the work during the year. The Finance Committee has given valuable advice in handling the funds of the Society. Our operating expenses have increased on account of the unusual demands resulting from the war. In spite of this, however, the Council has felt that the work of the Society in co-operation with the Government must be carried on even if it is necessary to draw on reserve funds set aside in previous years.

Change of Size and Name of Bulletin

In connection with the work of the Publication Committee, Part I of the 1917 Transactions is now under way and will soon be sent to each member of the Society. An important development on our publication affairs will take place in July, when the first issue of the *Journal of the Society of Automotive Engineers* will appear. The *S. A. E. Bulletin* has been issued for several years, but on account of the increased activities of the Society, it has become necessary to enlarge it. The name has also been changed, so that it will be characteristic of our new organization. The *S. A. E. Journal* will be issued in the standard technical size and will be a credit to the Society and an efficient means of carrying out its object.

The Meetings Committee has done exceptionally good work in preparing for the meeting we are holding today. It has planned all the details of hotel arrangements, gathering of papers, dinner arrangements and other matters that make this the most eventful meeting ever held by the Society; and this in the face of many changes of plans made necessary as war conditions have changed.

Two new sections have been added during the year, one at Buffalo, and the other at Minneapolis. The latter will devote its

attention mainly to tractor engineering problems. A large number of meetings have been held by the various sections during the year, at which many valuable technical papers have been presented.

The Council of the Society has appointed a Sections Committee, which will exercise general supervision over the work of the sections. This committee is constituted of three members designated by the Council and of the chairmen of all of the sections. A number of problems are under consideration by the Sections Committee, the solution of which will, it is hoped, increase the working efficiency of the various local organizations of the Society. The work of the sections is of the greatest importance in the proceedings of the parent body. It is believed that there is an opportunity for forming new sections in several automotive engineering centers. No better work can be done by the members of the Society who are not located so that they can readily attend meetings of the present sections, than in forming new sections and in obtaining the necessary additions to the membership of the society to carry on the work of such sections.

Thirty Per Cent Increase in Membership in 1917

The membership of the society has increased almost 30 per cent. during 1917. Great credit is due to the efforts of the Membership Committee. During April this committee carried on a special membership-increase program. A large number of new members are specially interested in the aeronautic, tractor and marine engineering work. There are still many men in the automotive industries who are qualified for membership and would not only be benefited by such membership, but would be in a position to take part in carrying on the work of the society. Each member is, therefore, urged to do his best to get men into the organization. There are now about 3000 members, so that there is work for all of us to do in arriving at the mark of 500 mentioned by President Huff in his address given at the last summer meeting, and which should be reached by the first of the coming year.

The Society of Automotive Engineers is an organization of great accomplishments and wonderful possibilities. Few among us will attempt to forecast the future of the aeronautic and the tractor industries, while great development in the automobile and marine fields is certain. The bringing of four great industries into co-operation should and will be followed to a logical conclusion.

We are members of what is justly known as the liveliest and most progressive engineering society in the world. Every one of us should have the greatest pride in our organization, an organization conceived because of the great need of national preparedness, and baptized in deep stress and turmoil of world warfare. When rest again settles on the earth, the society will go forward, its members cultivating the arts of peace, just as they are now following those of war. Then will history record the founding of the automotive industry through the inspiration and patriotic devotion of a body of men who had called themselves automotive engineers.

THE AUTOMOTIVE ENGINEERS AND THE AMERICAN AIR FLEET

For the proper prosecution of the war the United States can be most effective quickly by speedily carrying out its very large aircraft production program.

One of the greatest difficulties England and France experienced in the use of aircraft has been due to the great variety of engines and planes, for they started with twenty or twenty-five different kinds. In this country the best types will be concentrated on. Two types of training airplanes will be produced in very large quantities, and also the designs of battle engines which have proved most successful in Europe, as well as engines of American design. Engines of 250 h.p. capacity are essential in fighting planes. To obtain a standard engine of various sizes, according to the number of standardized cylinders, the Aircraft Production Board secured the services of Jesse G. Vincent, vice-president of the Society of Automotive Engineers and vice-president of the Packard Motor Car Co., and Elbert J. Hall, of the Hall-Scott Engine Co. Incorporating the best improvements developed abroad and here in an engine with standard parts will make possible quantity production on the scale necessary. Now that the type of engine required has been settled upon, progress will be rapid. The companies of the automotive industries are willing to work in a co-operative way.

An important factor in facilitating the production of aircraft is the standardization work of the Society of Automotive Engineers. The Aeronautic Division of the S. A. E., of which Charles M. Manly, of the Curtiss Works, is chairman, has been very active for over a year and has held many sessions at the Bureau of Standards in Washington and in other places. Among those who have served with and attended meetings of this division are: Major Henry Souther, senior officer of the Aircraft Engineering Division of the U. S. Signal Corps; Henry M. Crane, of the Wright-Martin Co., which has been producing Hispano-Suiza airplane engines; F. S. Duesenberg, L. M. Griffith, A. F. Milbrath, Glenn L. Martin, Capt. V. E. Clark, U. S. A.; Naval Constructor H. C. Richardson, Naval Constructor J. C. Hunsaker, Lieut. W. C. Child, Spencer Heath, of the American Propeller Co.; Director S. W. Stratton and Dr. H. C. Dickinson, of the Bureau of Standards; Elmer A. Sperry, H. E. Coffin, J. G. Vincent, C. B. King and F. W. Caldwell, U. S. Aviation Section; John G. Utz, chairman S. A. E. Standards Committee; Grover C. Loening, H. E. Morton, Prof. J. C. Riley, S. D. Walton, Dr. P. G. Agnew, L. A. Fischer, Prof. J. H. Nelson, H. B. Hubbard, Prof. C. F. Marvin, U. S. Weather Bureau; Capt. H. B. Wild, International Aircrafts Co.; Stanley H. Page, Union Gas Engine Co.; Thos. H. Huff, Standard Aero Corp.; J. E. Diamond, Aluminum Castings Co.; E. G. Gunn, Premier Motor Corp.; T. W. Benoit, Benoit Aeroplane Co.; H. M. Atwood,

Atwood Aeronautic Co.; F. E. Queeney, General Vehicle Co.; Raymond Ware, Thomas-Morse Aircraft Co.; A. V. Ver-ville, General Aeroplane Co.; F. K. Lord, Duesenberg Motor Co.; H. A. Bubb, Atwood Aeronautic Co.; G. Douglas Ward-rop, Evan J. David, Roger Craveau, U. S. Signal Corps; Lieut. D. W. Douglas, Lieut. A. K. Atkins, F. G. Diffin, E. H. Ehrman, J. E. Hale, E. A. Deeds, A. J. Knabenshue.

The Society of Automotive Engineers has established a standard propeller shaft-end, based on successful French practice. Its aeronautic division has made recommendations for standard airplane controls, loops for hard wires, splices and thimbles for flexible cable ends, turnbuckles, working of fuel and oil lines, engine supports and spark plug dimensions. The following standards which have been established for a long time in automobile manufacture are considered applicable in aeronautic practice: S. A. E. standard screws and bolts (for engines), steel specifications and heat treatments, test-specimens, ball-bearing sizes, throttle-levers, magneto dimensions (for 4- and 6-cylinder engines), cotter-pin sizes. The Aeronautic Division has reported to the Standards Committee of the S. A. E. recommendations for standard airplane bolts, plain hex heads for airplane bolts, airplane bolts, hex and castle nuts, ball hex heads, magneto base for 8- and 12-cylinder engines. Dozens of other subjects, some of great importance, are now being studied by the Aeronautic Division.

WESTINGHOUSE ELECTS OFFICERS

Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., recently re-elected the following officers: Chairman of the Board, Guy E. Tripp; President, E. M. Herr; Vice-Presidents, L. A. Osborne, Chas. A. Terry and H. P. Davis; Acting Vice President, T. P. Gaylord; Comptroller and Secretary, James C. Bennett; Assistant Secretary, W. H. Jones; Assistant Treasurer and Assistant Secretary, S. H. Anderson; Auditor, F. E. Craig, and Assistant Auditor W. B. Covil. Three new vice-presidential offices were created and the following were elected to fill same: Henry D. Shute and Herbert T. Herr, both of Pittsburgh, and Walter Cary of New York. H. F. Baetz, Assistant Treasurer, was elected to succeed Mr. Shute in the position of Treasurer. L. W. Lyons was elected Assistant Treasurer to succeed Mr. Baetz, and W. J. Patterson was elected to the newly created position of Assistant Auditor. At this meeting an extra dividend of $\frac{1}{2}$ of 1 per cent. on both common and preferred stock was declared for the benefit of the Red Cross fund. This dividend, which will amount to approximately \$375,000, is an addition to the regular quarterly dividend of $1\frac{3}{4}$ per cent. on both common and preferred stock, which was also declared.

International Motor Co., New York City, has announced the following prices of Mack chassis: 1-ton, \$2400; $1\frac{1}{2}$ -ton, \$2800; 2-ton, \$3000; $3\frac{1}{2}$ -ton, \$4250; $5\frac{1}{2}$ -ton, \$4750; $7\frac{1}{2}$ -ton, \$5000.

MILITARY TRUCK CONFERENCE HELD BY SOCIETY OF AUTOMOTIVE ENGINEERS

The Society of Automotive Engineers recently held in Washington a three-day conference of truck, engine, transmission, axle, frame, radiator, fan and bearing manufacturers, for the purpose of co-ordinating the production of the units to be installed in the U. S. Government military trucks. The purpose is to bring about interchangeability of these truck elements so far as possible, rather than to standardize them fully. Interpretations of the War Department specification will be arrived at satisfactory to all. Several of the transmission manufacturers believe, however, that their product can be completely standardized.

There was no intention of recommending in the meeting changes in the Government specifications in any major respect. One of the interesting developments was a general expression of opinion that it is practicable to standardize lengths and widths of the military truck leaf springs. This had never been attempted or proposed seriously before. Next to tires, springs require replacement on military trucks more frequently than anything else.

Another interesting result of special study is an air cleaner to be installed at the carburetor inlet to keep the astounding amount of dust collected in military truck service, out of the engine.

In general the truck units will be co-ordinated as far as possible without delaying prompt general production. The Government will be supplied with as many trucks of a suitable type as it can possibly need.

A subcommittee constituted of members of the S. A. E. is now at work in Washington checking up thoroughly the detail mounting dimensions proposed at the last meeting. Quarter size drawings of the trucks are being prepared. A final session on the matter was held in Washington on June 27, by the engineering representatives of the parts and truck manufacturing companies.

Among those present at the meeting were: Col. Charles Clifton, president, National Automobile Chamber of Commerce; G. W. Stiger, president, Motor and Accessory Manufacturers; L. M. Bradley, general manager, Motor and Accessory Manufacturers; John G. Utz, chairman of the S. A. E. Standards Committee; K. W. Zimmerschield, manager, Washington Office S. A. E.; Coker F. Clarkson, general manager S. A. E.; A. W. Copland, chairman Transmission Division of the S. A. E. Standards Committee; Capt. W. M. Britton, Quarter Master Corps, U. S. A.; C. C. Hinkley, Chalmers Motor Company; F. G. Hughes, chairman Ball and Roller Bearings Division; George W. Turney, R. W. Austin, Viggo V. Torbenson, D. K. Moore, B. D. Gray, B. F. Wright, Federal Motor Truck Co.; Chas. Balough, O. J. Strayer, Hercules Motor Mfg. Co.; R. J. Broege, The Buda Co.; A. F. Milbrath, Wisconsin Motor Mfg. Co.; A. M. Laycock, J. A. Young, Sheldon Axle Co.; H. R. MacMahon, A. W. Russell, J. T. R. Bell, Gurney Ball Bearing Co.; G. W. Carlson, Timken Detroit Axle Co.; Watt L. More-

land, Moreland Motor Truck Co.; F. A. Whitten, General Motors Co.; J. A. Kraus, Garford Motor Truck Co.; E. P. Reber, Cotta Transmission Co., R. J. Burrows, E. E. Wemp, Denby Motor Truck Co.; S. O. White, Warner Gear Co.; L. P. Kalb, Kelly-Springfield Motor Truck Co.; W. A. Frederick, Continental Motor Mfg. Co.; H. L. Horning, Waukesha Motor Co.; B. G. Koether, Hyatt Roller Bearing Co.; A. E. Parsons, W. C. Lipe, Brown-Lipe Gear Co.; T. V. Buckwalter, Timken Roller Bearing Co.; A. C. Bryan, Durson Gear Co.; L. C. Fuller, A. A. Gloetzner, G. W. Yoeman, Continental Motor Mfg. Co.; M. W. Hanks, S. A. E. Office.

AUTOMOBILE DEALERS TO ORGANIZE

A movement is on foot to form a national organization to embrace all of the State and local automobile dealers' associations of the country. The need for a national unit has been felt for some time, but the idea of forming one was not crystallized into action until the various individuals got together who were in Washington recently to go before the Senate Finance Committee and argue against the 5 per cent. tax on the factory price of automobiles.

A tentative organization was effected at the New Willard Hotel in Washington on May 25 and telegrams were sent out to leading associations not represented, asking their co-operation in making the organization permanent. A meeting to this end is to be called in Chicago by the Organization Committee, of whom the following are members: George W. Browne, Chairman, Milwaukee Automobile Dealers, Inc.; Albert T. Clark, Kansas City Automobile Trade Association; G. A. Will, Minneapolis Automobile Trade Association; Edwin P. Bodley, Chicago Automobile Trade Association, and Ernest T. Conlon, Grand Rapids Automobile Trade Association.

Bart J. Ruddle, secretary of the Milwaukee Automobile Dealers, Inc., has been appointed organization secretary to bring about a convention of distributors and dealers in Chicago, at which the Organization Committee will report a plan of organization. This meeting will probably be called late in June or early in July when dealers and distributors are likely to be at the factories and can more easily arrange to attend without making a special trip for that purpose.

GENERAL MOTORS TO BUILD TRACTORS

The General Motors Co. is preparing to enter the farm tractor manufacturing field on a large scale. The company recently purchased the plant and patents of the Samson Tractor Co., Stockton, Cal., and President Wm. C. Durant, who is devoting much of his time to the development of a tractor, plans to manufacture the tractor in various plants of the GMC Co. throughout the country.

TO REDUCE UNPROFITABLE MILEAGE

It has been hard to make people realize that the loss through a single idle commercial car is far greater than through an idle horse vehicle, since not only does the machine represent three or four times the work potentiality, but at least three or four times the cost. The European business man is learning it under the stress of war conditions, and in Great Britain there is concerted effort toward more economical working to reduce light, unprofitable mileage.

This movement seems coming to a focus now that conditions have led the Ministry of Munitions to take up the matter, and with the co-operation of the Birmingham Chamber of Commerce, the owners of commercial automobiles in the Midlands have been canvassed to see how such a proposition would appeal to them. The result has been that the majority favored the idea, and accordingly arrangements to insure return loads as far as possible are to be organized between Birmingham and Coventry, Dudley, Kidderminster, Walsall, Wolverhampton and the Black Country.

If this undertaking is successful, the idea will be carried still further, and other important centres will similarly be linked up.

Some time before the war a somewhat similar scheme was set on foot, but the influence of private enterprise was not sufficient to bring owners of commercial cars into line. The public influence of the Min-

istry of Munitions, however, coupled with the stress of war, has been able to effect the hitherto impossible.

BRITISH GASOLINE RESTRICTIONS HELP ELECTRIC

The excessive price of gasoline and the difficulty of obtaining it in Great Britain, are having their effect on the electric vehicle industry; as an example, J. Loynes & Co., Ltd., a large firm of caterers in London, have decided to spend some \$400,000 on electrics.

WILLYS TO BUILD AIRPLANES

It is expected that John N. Willys, who recently became a director in the Curtiss Aeroplane & Motor Corp., will become president. An entirely new plant is to be established at West Toledo, O., where complete planes will be made by the quantity production methods of which Willys has proved himself a master. The present aeroplane engine building activities of the Willys-Overland Co. will be proportionately increased.

THE COMMONWEALTH EDISON Co., Chicago, Ill., has a plan to give complete garage and maintenance service for commercial electric vehicles at specific rates per annum on long term contracts. The service will cover minor repairs of all kinds, renewal of tires and batteries when worn out, and storage, including cleaning and care of vehicles, etc.



Five-Ton GMC Tows Freight Locomotive

Here is presented the illustration of the pulling power of a motor truck, which towed a huge freight locomotive for two city blocks without any difficulty. It was a GMC five-ton truck that did the trick, and the place was Seattle. The demonstration of GMC pulling power was arranged as the result of a wager between R. F. Weeks, division freight and passenger agent of the Chicago, Milwaukee & St. Paul Railroad, and W. D. Albright, Northwest manager of the B. F. Goodrich Rubber Company. The locomotive's weight was 309,480 lb., and the truck weight less than one-thirtieth as much. To give the truck weight it was loaded with nearly five tons of cement, and was then backed to the front of the engine.

Heavy chains were used from the drawbar of the locomotive to the truck frame. Mr. Weeks, the skeptic of the proposition, signaled the start and the truck moved forward. There was an instant's halt as the dead weight of the locomotive pulled back, and then the locomotive began to move slowly. The rest of the two-block tow was uneventful.

"A little knowledge is a dangerous thing." The CCJ keeps you fully posted

DALLAS BUSINESS MEN TAKE TRIP TO GALVESTON

The Dallas Implement, Hardware, Saddlery and Tractor Club and the Dallas Automobile & Accessory Dealers' Association to the number of 150, headed by Frank P. Holland, publisher of Farm & Ranch, started on a trip from Dallas to Galveston on June 12th. The object of the trip was to attend a joint session of the Texas Press Association and the manufacturers and heads of implement, machinery, saddlery, automobile and other concerns held on June 15th, in Galveston. All arrangements for the comfort and pleasure of his guests were made by Mr. Holland. Headquarters were located at the Hotel Galvez, Galveston, where two floors were engaged. The party returned to Dallas on the 17th. The trip in every way was highly successful.

GENERAL MOTORS TRUCK COMPANY COMPILES BOOK ON TRUCK'S JOURNEY

Motor truck men and motorists of every station were vitally interested last summer and fall in the double transcontinental journey made by a one-and-one-half ton G M C truck, which first successfully negotiated the National highway from Seattle to New York and then returned to the Pacific port by way of the Middle West and Southwest. Wm. Warwick drove the entire journey alone. His experiences in the mud of every state, over mountains and through canons make a tale as romantic as any fiction. In addition, he had the advantage of photography and his story of the trip has ample illustration in the snapshots which he took at every stage of the way. The General Motors Truck Co., Pontiac, Mich., has compiled his story and pictures into an attractive booklet for the benefit of any one who would like to read the story of the truck's long voyage. These booklets are just recently off the press and will be gladly sent to any who ask for them.

SOME COMPANIES WHO HAVE BOUGHT LIBERTY BONDS FOR THEIR EMPLOYEES

S. F. Bowser & Co., Ft. Wayne, Ind., had a 2-day campaign and sold bonds to its employes to the amount of \$130,950. The factory and office were divided into divisions, and a captain and lieutenants were placed in charge of each division, explained and sold bonds to their fellow workers.

Prest-O-Lite Co., Indianapolis, offered to its employe investors 1½ per cent. interest on the Liberty Bonds they purchased, in addition to the 3½ per cent. paid by the Government. The sales amounted to over \$84,350.

CRESCENT MOTOR TRUCK Co., INC., temporarily located at 1457 Broadway, New York City, has been incorporated to market a 1500-lb. delivery car to be assembled from the highest grade parts. Production is expected to start about September 1st. Jos. W. Brooks is president of the new company.

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AN ADDITION TO CHILTON SERVICE

THE publishers of the *Automobile Trade Journal* and THE COMMERCIAL CAR JOURNAL like to feel that they are conducting an enterprise that goes beyond the mere publishing of periodicals in which space can be sold to advertisers. Thus it is that there has grown up what we call with some pride "Chilton Service" and it is ever our aim to make that mean more and more.

A direction in which we have felt that there is an opportunity to do something further is the bringing together of inventors of meritorious devices and manufacturers with spare plant capacity, who would be interested in either manufacturing the goods for the inventor or acquiring the rights and manufacturing and selling entirely on their own account.

It is apart from the intended scope of our publications to use the reading pages for the promotion of patents and inventions. In other words, we do not undertake to describe new things until the devices themselves are purchasable by any who may be interested. We have felt, however, that without some effort to serve in this direction we were not doing all that we could do for the good of the automobiles, commercial cars, accessory and supply trade.

To the end that we may give this kind of service outside of our reading pages, we are asking that all manufacturers who have spare capacity that might be turned over to the making of accessories or parts that promise to sell well, notify us so that we may keep their names on file, together with a statement covering about the sort of thing they will be in position to make, something about their possible capacity of such devices and any other information that would be of help in determining what things coming to our attention might appeal to them. With this information in a card index when we receive inquiries from inventors who are looking for someone to manufacture for them on contract or who are looking for a chance to dispose of inventions, we will be in position to bring interested parties together. In this service of co-operation we expect to use intelligence and not prove ourselves a nuisance to manufacturers by taking up their time in considering freak things or other than what appear to be probably easily marketed goods.

STANDARDIZING MILITARY TRUCKS

SO MUCH good has been done by the Society of Automotive Engineers, formerly the Society of Automobile Engineers, in the way of standardizing automobile part, that it would sound almost like heresy to question the advisability of any work it is doing of that kind. In connection with the work of securing interchangeability of military trucks, in which the Society is co-operating with the Government, no question can be raised of the desirability under ordinary conditions, but there is some doubt as to the advisability or practicability of the effort in time to be of use in the present war or at least with the first trucks ordered.

The most essential thing now is to get trucks quickly. Manufacturers can certainly turn out the product they are accustomed to building, with less delay than they can, any new design or even modified design. They can also produce them cheaper in all probability unless their standard model is excessively expensive to build.

It would, of course, be highly advantageous to be able to carry at repair stations a small spare stock equipment, but there unquestionably is a limit to which things can be standardized.

We are told that the engine and transmission people have already done considerable, but it does seem as though the rear axle must either be confined to one type or any idea of standardizing there abandoned. Worm and internal gear axles cannot be made interchangeable without considerable modification of the brake rigging and probably the use of different lengths of propeller shaft.

It would seem better, if the Government wishes its trucks all of one kind, to select only the builders of that kind of truck to supply the army and let the other builders stick to their models for supplying the demands of the business public. Some makers must either be permitted to supply trucks that do not conform to the standard or else must be ruled out,

including those who make four-wheel drive machines and six-cylinder trucks, for instance. If discrimination against or special dispensation for these makers is permitted, why not go farther and eliminate all who do not make the one type of car preferred by the Government.

If the standard, as ultimately adopted, is different from some existing make of car and the Government does purchase a variety of makes, the attempt at a standard will mean, instead of a reduction of stock necessary to carry at repair stations, one more model (the standard), for which parts will be needed.

While we wish the Society and the Government every success in their endeavor—if it will work out to the country's good—we cannot refrain from calling attention to what look to us like insurmountable obstacles to a successful carrying out of the program in the limited time available. The purpose is laudable, but can we afford, in the present crisis, the time necessary for its successful accomplishment?

POSTAL LOCAL DELIVERY SERVICE

IT IS REPORTED that the Government contemplates, as a war-time economy, the handling of the delivery services for the retail dry goods concerns in New York City through the Post Office Department. It is contemplated to extend the plan to other cities, but only where the stores themselves wish it; in other words, it is not to be an enforced service, but an elective one, the Government simply standing ready to serve if desired.

Metal and Rubber Markets

Steel Mills Swamped by Government Work

The demand for steel for Government use is heavier than was first anticipated. Early estimates placed the Government's requirements at 3 per cent. of the country's output. The orders in sight at the present time, directly from the steel mills and indirectly from the manufacturers of steel products, come nearer at a guess representing 40 per cent. of the steel producing capacity of the nation. The private consumer is in a quandary. It matters little what he offers for steel because he cannot get it at all until the war requisitions of every grade and kind are satisfied. Quotations on July 7th were:

Steel Products Prices

Bessemer billets, per ton mill 95.00 a100.00
Open hearth, per ton, mill.... 95.00 a100.00
Sheet bars, per ton.....105.00 a110.00
Forging billets, per ton, mill..115.00 a125.00

Sheets

The following prices are for 100-bundle lots and over f.o.b. mill; smaller lots are \$2 per ton higher:

Blue Annealed Sheets—

Nos. 3 to 8..... 8.00 a 8.50
Nos. 9 to 10..... 8.25 a 8.50
Nos. 11 and 12..... 8.50 a 8.75
Nos. 13 and 14..... 8.75 a 9.00
Nos. 15 and 16..... 9.00 a 9.25

No. 17 and lighter gauges are based on \$6.50 a \$7.50 per 100 lbs., for No. 28 Bessemer Black sheets.

Box Annealed Sheets, Cold Rolled—

Nos. 17 to 21..... 8.30 a 8.50
Nos. 22 and 24..... 8.35 a 8.85
Nos. 25 and 26..... 8.40 a 8.90

What advantages there may be in the proposition would seem to come from the possible reduction of the number of individual units necessary in delivery service. For example, it is thought that 600 would do the present work requiring 1000, but whether this would really mean economy is a question, since it would undoubtedly be a considerable expense to the post office to bring its facilities up to the point where they could cope with the increased demand. It is quite an undertaking when the Government offers even to deliver pianos, so we are told.

The principal difficulty would be the sorting of parcels, getting them ready for delivery. The individual stores have trouble enough of that kind now, and when this is multiplied by the number of stores served it will surely be a serious problem.

Again, it is a question as to what redress there could be if patrons complained of service being delayed. There would be little chance for the individual store to obtain improved service, as it could by having its own employees doing the work.

Another disadvantage, although not so serious, perhaps, would be the loss of the advertising for the merchant in not having his own delivery cars or wagons circulating about the city.

If there is any real advantage to the Government or an economy to the merchants to come from the plan, the experiment should, by all means, be tried; but if it is certain to be a failure, and sufficient forestudy can develop that fact, the sooner the idea is abandoned the better.

Galvanized Sheets of Black Sheet Gauge—			
Nos. 10 and 11.....	9.00	a	9.50
Nos. 12 to 14.....	9.10	a	9.60
Nos. 15 and 16.....	9.25	a	9.75
Nos. 17 to 21.....	9.40	a	9.90
Nos. 22 to 24.....	9.55	a	10.05
Nos. 25 and 26.....	9.70	a	10.20

Above prices are for Bessemer stock. For open hearth stock \$2 per ton advance is charged.

Tin—Mill Black Plate—

Nos. 15 and 16.....	7.80	a	8.30
Nos. 17 to 21.....	7.80	a	8.35
Nos. 22 to 24.....	7.90	a	8.40
Nos. 25 to 27.....	7.95	a	8.45

Iron and Steel at Pittsburgh

Bessemer iron, Valley furnace	57.00	a	58.00
Bessemer steel, f.o.b. Pittsburgh	75.00	a	...
Skelp, grooved steel	4.00	a	4.50
Sheared steel skelp	4.50	a	5.00
Ferromanganese (80 per cent.)	42.00	a	44.00
Steel, melting scrap	42.00	a	45.00
Steel bars	4.25	a	4.50
Manganese ore, per unit	1.00	a	...
Black sheets, 28-gauge	8.50	a	9.00
Galvanized sheets, 28-gauge	10.25	a	11.50
Tank plates	9.00	a	9.50

ALUMINUM.—Apart from Government requirements, the market is quiet and prices are unchanged from the quotations which have prevailed for some time. No. 1 virgin, 98 to 99 per cent., 57 a 59c; pure remelt, 98 to 99 per cent., 55 a 57c; No. 12 alloy remelt, 42c to 44c.

Prices of Old Metals

	Cents per pound
Copper—	Buying. Selling.
Heavy cut & crucible	28.00 a 29.00 29.00 a 30.00
Heavy and wire	27.25 a 28.00 29.00 a 29.50
Light and bottoms	24.00 a 25.00 26.00 a 26.50
Heavy machinery comp	24.50 a 25.00 26.50 a 27.00
Brass, heavy	17.00 a 18.00 18.50 a 19.25
Brass, light	14.00 a 15.00 15.00 a 16.00
Lead, heavy	9.75 a 10.00 10.25 a 10.75

Tea lead	8.50	a	9.00	9.50	a	9.75
Zinc scrap	6.75	a	7.00	7.50	a	8.00

The buying prices are those which the larger dealers will pay; the selling prices are market quotations.

Rubber Market Quiet

The rubber market is quiet and featureless, there being little demand from the manufacturers who are holding off for the present, being fairly well supplied. Quotations on July 7th were:

Para—Up-river, fine, per lb. ...	69	a	69 1/2
Up-river, coarse	49	a	50
Island, fine	70	a	71
Island coarse	34 1/2	a	35
Caucho, ball, upper	44	a	45
Caucho, ball, lower	43	a	43 1/2
Cametta	35	a	36
Ceylon—First latex, pale crepe..	67	a	..
Brown crepe, thin, clean	61	a	62
Smoked ribbed, sheets	67	a	..
Centrals—Corinto	49	a	49 1/2
Esmeralda	49	a	49 1/2
Guayule, Satillo	41	a	42
Balata, sheets	86	a	..
Balata, block Ciudad	68	a	68 1/2
Mexican—Scrap	48	a	48 1/2
Frontera	48 1/2	a	49
African—Massai red	62	a	..

Domestic Scrap Rubber

Tires—Automobile	7 1/2	a	..
Bicycles, pneumatic	4 1/2	a	5
Inner tubes, No. 1	24 1/2	a	..
Inner tubes, No. 2	12 1/2	a	..
Red	12 1/2	a	..

THE FRIENDLY TOUCH is the title of a 24-page booklet just issued by the Black & Decker Mfg. Co., Baltimore, Md., showing that company's line of Lectroflater Air Compressors and Portable Electric Drills. This booklet is sent free upon request.

UNITED MOTORS TO GIVE ELECTRIC SERVICE

The United Motor Service, Inc., a subsidiary of the United Motors Corp., recently organized, has branched out in different parts of the country for the purpose of giving service on the electrical products of the United Motors Corp. Head offices of the company are in Detroit. There is a branch in Chicago and one at 239 W. 56th St., New York City. Other branches will be opened as quickly as possible. Delco and Remy starting, lighting and ignition systems and Klaxon horns are the proper concern of the company. Ralph H. Lane, formerly engineer of the Hyatt Roller Bearing Co., is president of the new concern, and also president of the Bearing Service Co., which performs a similar function for the bearing manufacturing group of the United Motors Corp. Each station will contain complete equipment for electrical service, including a large stock of complete units and repair parts. A service garage with repair and testing department will be a feature of the plan. When a new station is opened in any territory, the three manufacturing concerns, the Remy Electric Co., the Dayton Engineering Laboratories, and the Klaxon Co., will discontinue their arrangement of giving service there, turning the work over to the Service Co.

DIAMOND FIBRE PRODUCTS

The Diamond State Fibre Co., Bridgeport, Pa., are offering to the trade a line of fibre products. These include gears, receptacles, conduit tubes and many other specialties which are adaptable to machine shop use. The fibre gears which are fitted with brass flanges are claimed to have approximately the strength of cast iron gears and due to their slight elasticity they are very suitable for high-speed drives. They are not harmed by oil, and, not being animal matter, they are unaffected by the heat often resulting from hot bearings.

NATIONAL ASSOCIATION OF AUTOMOBILE ACCESSORY JOBBERS, at a recent meeting of the Executive Committee, elected the following jobbers: D. W. Alderman, Jr., Florence, S. C.; Borderland Auto Supply Co., El Paso, Tex.; Dine-DeWees Co., Canton, O.; Denver Auto Goods Co., Denver, Colo.; Foster Auto Supply Co., Denver, Colo.; C. W. Greene Co., Tampa, Fla.; Geller, Ward & Hasner Hardware Co., St Louis, Mo.; Hilliard & Yokes, Erie, Pa.; Johnson Tire Co., Montgomery, Ala.; Master Sales Co., Omaha, Neb.; Northwestern Auto Supply Co., Billings, Mont.; Price Auto Equipment Co., Wichita, Kans.; Western Motor Supplies, Ltd., Regina, Saskatchewan, Can.; Williams Hardware Co., Clarksburg, W. Va.

Manufacturers: Bailey Non-Stall Differential Corp., Chicago, Ill.; Champion Spark Plug Co. of Canada, Windsor, Ontario, Can.; Colorado Tire & Leather Co., Denver, Colo.; Connecticut Telephone & Electric Co., Meriden, Conn.; Standard Woven Fabric Co., Walpole, Mass.; Victor Mfg. & Gasket Co., Chicago, Ill.

STONER COMPLETES MT. WILSON OBSERVATORY HAULAGE

Those of our readers who read the previous accounts in this journal of how Jack Stoner hauled 13-ton pieces of structural steel to the summit of Mt. Wilson, can now breathe easier, for the last trip on this job has been completed. The last and most valuable piece to travel skyward was the giant mirror. The loss of this would have rendered valueless all the work previously

done, as the glass was supported in a huge timber cradle fitted with coil springs and rubber bumpers, so that road shocks were cushioned to the highest degree.

WILLYS-OVERLAND Co., Toledo, O., has recently installed a 2,000-ton press that will handle steel 17 ft. long and $\frac{3}{8}$ -in. thick, for the manufacture of side members for automobile frames. It weighs 325 tons and is said to be one of the largest presses of its kind in the world.

The Horseshoe Bend

Between the turns on the famous Horseshoe Bend, where reduced traction on the sharp turn tests power to the extreme limit.

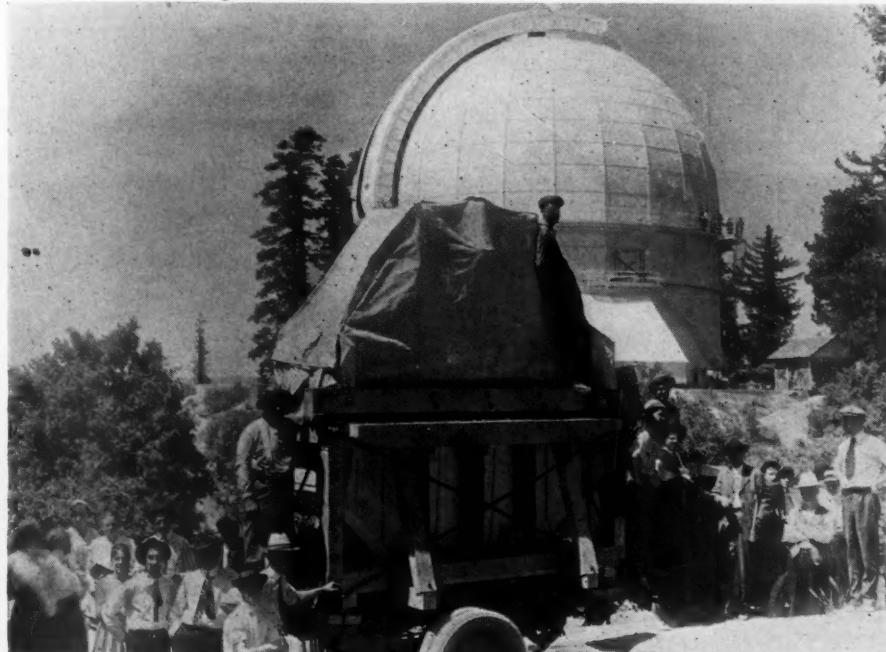


done for years to come. The mirror is not only the vital part of the telescope, but under present conditions is irreplaceable. It is a slab of special glass produced in Europe before the war, 100 in. in diameter, 15 in. thick and weighs $4\frac{1}{2}$ tons. The rough cast was made in 1905 and brought to Pasadena in 1909. It took six years to grind and polish it.

The success of the trip was due, aside from skillful driving and the capacity of the truck to withstand the punishment of the severe grades under its load, to the absolutely stable and rigid method of fastening the load to the truck body. The

NEW DEPARTURE MFG. CO., Bristol, Conn., has opened what it considers the largest building of its kind in the world. It is a complete factory in itself and will be used for the manufacture of steel balls. It is 4 stories high and has a total space of 178,000 sq. ft. or nearly 2 acres.

THE ROGERS BROTHERS CO., of Albion, Pa., with whom the New York Co. is in very close touch, is now manufacturing some thirty odd models of trailers of every type, ranging from 1000 lb. capacity to 10 tons, and are now doing a very substantial business throughout the entire country and abroad.



Near the Finish of the Last Trip
Arrival at the summit of Mt. Wilson with spring-crated mirror for the largest telescope in the world

Personal Items

Lloyd A. Bachman, for a number of years city buyer for the Chalmers Motor Co., has become assistant purchasing agent for the J. C. Wilson Co., Detroit, manufacturer of the Wilson truck.

A. C. Bagley, formerly credit manager of the Hess-Bright Mfg. Co., Philadelphia, has become manager of the credit department of the Motor & Accessory Manufacturers, New York City.

W. E. Bertsch has become advertising manager of the Elgin Motor Car Corp., Chicago.

Eugene P. Hermann, a well-known commercial car distributor in New York City, has sold his interest in the Republic Motor Sales Co. to W. J. B. Motor Co. Mr. Hermann introduced the Republic truck to the Metropolitan district and developed the business considerably. He has not announced his future plans.

John Lottridge, formerly with Cuyler Lee, of San Francisco, handling Packard cars, has taken the agency for the United States motor truck for the state of Georgia. He has formed the John Lottridge Motor Sales Co., of Atlanta, and has appointed Samuel C. Slaughter, also formerly with the Cuyler Lee Co., as sales manager of his new company.



GUY E. NORWOOD

Recently elected president of the Republic Rubber Company, Youngstown, Ohio. He is also chairman of the board of directors.

New Truck Agencies

Dalzell Motor Car Co., Youngstown, O., has taken the agency for the Niles truck in 20 counties in Ohio and Pennsylvania, including Allegheny. Mr. Van Valkenburg has been placed in charge of the Pittsburgh district. The Ohio and western Pennsylvania territory will be taken care of by the home office.

Eastern Motor Sales Co., Boston, Mass., has taken the agency for the Diamond T truck.

Elliott Motor Sales Co., Muskogee, Okla., has taken the agency for the Smith Form-a-Truck.



J. M. KURTZ

Has been elected secretary of the Canton Auto Parts Manufacturing Company, Canton, Ohio. He was formerly with the Westinghouse Company.



C. H. SORRICK

Who joined the Firestone Tire & Rubber Company in 1911, has been appointed manager of sales. He succeeds Frank C. Blanchard.



Those Attending the Annual Outing of the Motor Truck Club of Philadelphia

The annual outing of the Motor Truck Club of Philadelphia was held on Saturday, June 16, 1917, at Kugler's Mohican Club, on the Delaware. The afternoon was featured by free-for-all races, quoit games, rifle shooting and a baseball game. A shad dinner was served, followed by speeches by George Graham, Edward J. Cattell and others. The illustration shows the members and friends who attended attired in white overalls, furnished for the occasion. A band enlivened all the games and the dinner.

Hanneck & Bilz, Denver, Colo., has taken the agency for the Koehler truck.

Harrisburg Welding & Brazing Co., 88 S. Cameron St., Harrisburg, Pa., has taken the agency for the Armleder truck.

A. J. Hersey has opened a salesroom for the Republic truck at 240 W. 7th St., St. Paul, Minn.

H. O. Marshall Auto Co., Fresno, Cal., has secured the agency for the Republic line of trucks.

C. N. Minner & M. W. Abts, Morrill, Neb., have taken the agency for the Smith Form-a-Truck.

Saxon Sales and Service Co., 529 Washington St., Portland, Ore., has taken the agency for the Acme truck.

Charles Scharff's Sons, 132 Stanhope St., have taken the agency for the Collier truck.

Shaw Motor Co., 601 Highland Building, Pittsburgh, Pa., has been appointed distributor for the Diamond T truck.

Z & W Motor Co., Inc., has opened a salesroom at 1019 Bedford Ave., and a service station at 220 Clifton Place, Brooklyn, N. Y., and will handle the Vim, Burford and Koehler trucks.

Youngstown Tire & Accessory Co., Youngstown, Ohio, has taken the agency for the Mack truck for five counties in the vicinity. Frank Thompson will head the truck department.

Lessons of the War in Truck Design*

Details, More Than General Makeup, Need Perfecting

By W. O. THOMAS†

THE trucks used in France by the British Army at the beginning of the war were mostly of the commercial type not especially designed for war service. This was true of the trucks made in Europe as well as those sent from America. A very small number of the so-called subsidized British War Office pattern had been built. The majority were taken out of regular commercial service. Many of them had been in use as omnibuses by the London General Omnibus Co. and the bodies were replaced by others quickly built to meet the emergency. Some of the European-built trucks were fitted with four-speed transmissions of the commercial type to permit the use of smaller engines and greater fuel economy.

The English and American trucks consisted of about nineteen different makes and forty-two different models of widely varying design, so that the problem of providing spare parts and maintaining the trucks in service soon became very great. The makers were working overtime producing new trucks and there was a consequent shortage of spare parts.

My first study of the maintenance problem showed that some vehicles had been out of service from three to five months and that a large number of one of the American trucks, which were in general giving good satisfaction, were out of commission on account of shortage of clutch thrust collars, gearshifts, fan bearings and front wheels. It was soon evident that most of the trouble was not with the main points of design, but with gear ratios and other minor details.

Many trucks were geared too low on high to stand the test of high engine speeds in emergencies and these naturally developed engine trouble and broken crankshafts. All of them were geared too high on low and reverse to operate successfully under the bad road conditions which were constantly being made worse by the German shells, with the help of the heavy rains and floods.

Ideal War Truck Good Commercially

It must not be supposed that an ideal war truck should be something not adapted to general service conditions. The constant heavy duty under which the war truck is operated must produce a simpler, more reliable and more easily maintained truck for use under ordinary commercial conditions. The war truck is generally operated by a man who has never driven a truck before and who probably has never even driven a touring car. He is recruited as a soldier and afterward trained as a me-

chanical transport driver. In the English Army he is a private in the Army Service Corps, and the officer over him is also likely to be new at the truck work.

The English Army Service Corps deals mainly with the problem of feeding the men and horses of the army. The transporting of the food came under an Army Service Corps officer called the Director of Transport and Supplies, and the transport work by horses meant principally the addition of a little more forage. When the horse transport was superseded by motor trucks the system still remained under the control of the same officer, although he had had little mechanical experience. The problem gradually changed to one of mechanical operation and maintenance, but in the English Army the administration of it is still an adjunct to the Commissary.

In the French Army before the war the use of motor vehicles was much further advanced and was part of the artillery command. The officers in this command were technically trained and well equipped for the problem, but in both the English and French armies it was necessary to call in men who had had previous engineering experience along automobile lines. Personally, I can see the need of keeping the mechanical transport operation and maintenance separate from the older departments of the army, although it might be possible to combine the maintenance facilities of the automobile, motor truck and aeronautic sections.

Truck Drivers Must be Trained

The training of the army personnel in the use of mechanical transport is important in order that the trucks in use may be properly operated and maintained. The men, as well as the trucks, need steady reinforcements and replacements, amounting to three per cent. per month even after the army is complete in the field. Besides these additional men under training, two months' reinforcements must always be available at the advanced base, and two months' reinforcements at the base, where they can undergo additional training until they are called.

The training of a transport private or officer takes about three months in addition to the time required for their training as soldiers. It is necessary to divide the training of both into three distinct parts: (1) the ordinary book knowledge of the subject in the Mechanical Transport School; (2) driving and operation; (3) system of maintenance and repair. I am satisfied that a thorough training of the personnel more than pays for itself in the improved condition of the equipment afterward, and that what has been found necessary in this direction should be given careful consideration by the United States Government in building up the mechanical transport division of its army.

It is difficult for the average engineer and writer to compare European trucks at the front with those sent over from America. They are good and bad from entirely opposite standpoints. The European trucks for the main part were better designed in detail and much more refined than the trucks sent from America, but their parts were not nearly so interchangeable, and it was more difficult to repair them on account of the hand-fitting that is an essential feature of the system under which they are manufactured. The parts of some of the American cars and trucks were interchangeable to an extent beyond the comprehension of the average British or French officer.

Repair Parts in the Field

To maintain trucks in the field the English Army ordered a list of parts for every truck varying from 10 per cent. of the total of all of the main units on the trucks in use to 100 per cent. of all nuts, bolts, carburetor floats, bearings, washers, brake linings, gaskets, clutch facings, etc., and 200 per cent. of all spark plugs, fan belts, hose connections, etc.

After the trucks had been used for some time a monthly list was prepared for the parts which experience showed were needed to maintain the trucks in service. This list was known as the 3 per cent. list because it contains 3 per cent. of all main units in service and up to 100 per cent. spark plugs, etc. A stock of these parts equal to a six months' supply is carried at the various bases. This stock besides being added to by the regular 3 per cent. monthly list can draw in emergency from the reserve stocks at the base, which are replenished by special orders.

While 3 per cent. of the main units are assumed as required in an assembled condition each month, all of the separate component parts of these units are also carried in an additional proportion, for instance, crankshafts are an additional 3 per cent., bearings from 10 to 30 per cent., etc. About 2 per cent. per month of the complete trucks in service are also replaced with new trucks on account of being beyond repair with new units or parts.

If all of the above allowances for repair and replacement were used up in any given period and charged at the same rate as the parts in the original truck the value of each original truck will have been entirely doubled after about eight months' service. Actually the parts replaced are always enough to maintain more than a balance so that the nominal life of the truck covers a slightly longer period. With this life, the investment for trucks and replacement parts f.o.b. factory averages about \$16 per day per truck in service, which for war conditions is a creditable showing for mechanical transport.

* From a paper presented to the Society of Automotive Engineers at Washington, D. C., June 26, 1917.

† Consulting Engineer, 870 Woodward Avenue, Detroit, Mich.

The need of standardization of parts cannot be too strongly emphasized. After going through this problem under actual war conditions it is easy to realize the enormous saving of time and expense in the shipment and replacement of repair parts if the units of the various trucks are rapidly replaceable by having their main dimensions and supporting points standardized. Personally I feel that the standardization should be carried out even further, because the problem in the field is to repair quickly the unit that has been removed from a truck.

I remember seeing in France 180 cars of one Detroit make all with the same complaint. They were ready for use except for one gear in the transmission, and a condenser. Some of them had never been in service, but had been robbed for the repair of others at the front.

On another occasion I was able to supply a differential intended for a touring car axle as a repair for the jackshaft of a fire truck, which otherwise would have been out of service for a long time. In England today under government control many companies are using detail parts belonging to other cars and trucks without the necessity of making additional dies and tools. My impression is that much time would be saved by starting out at once to standardize along this same plan.

Government Should Determine Standard

In order to standardize effectively, the government must assume the responsibility for the design used, for the distribution of the material of the proper quality, and for the manufacture of all forgings and similar parts needing dies and special tools. Such a design should be utilized to an extent not hitherto possible. For instance, the clutch housing should support the clutch operating mechanism, the transmission unit should be integral with the gearshift, and all operating mechanisms should be integral with and supported upon the units they control and not be separately supported on the frame. Much of the derangement of parts caused by damage to the frame itself would be thus avoided.

Care should be taken in the adoption of a standard that all of the parts are inclosed and protected against mud and weather. I have seen an artillery ammunition park, ready to move toward the front, stationed at the roadside for such long periods that it was necessary to tie up the brake mechanism with canvas and to cover the radiator, wheels and other exposed parts in the same way to prevent them being rendered inoperative by the splashing of mud from other passing vehicles.

The English Army uses principally one size of truck of 3-ton capacity, somewhat larger than the United States Class "A" truck. Smaller trucks are called for to handle hay and oats, as these do not weigh so much as some of the other stores. In practice, however, these loads are bulky and are carried in the largest body available.

The French standard trucks are of 2 and 5 tons capacity, the 2-ton truck being somewhat smaller than the Class "A" and the 5-ton being about the same as the Class "B" truck.

The trucks are normally operated at from 12 to 15 m.p.h., but the governors are usually set to allow of a speed of 18 to 20 m.p.h. in an emergency. Very often the governors are disabled, and many trucks are not provided with governors at all.

Most of the trucks in France are geared so that their engines will operate continuously at 18 or 20 m.p.h. on high gear in emergency. They are also required to operate on second gear up to a normal speed of 12 m.p.h. so that in an undulating country the convoy is not spread out by vehicles slowing up on the hills. The later trucks designed have a reduction of fifty to one on low gear in order that they will maneuver on low and reverse under bad road conditions without its being necessary to race the engine in starting.

It is found in practice that even the axles do not suffer as much by this extreme reduction as they do from racing the engine and letting the clutch in, as is necessary with some older type trucks sent from America.

Road Clearance Insufficient

Many of the early trucks were found wanting on account of insufficient road clearance. This has been remedied in the later designs by the adoption of transmissions with the layshaft placed sidewise of the main shaft, by double-gearred rear axles, and by the use of heavier and smaller diameter flywheels than formerly. The ground clearances demanded in the United States specifications are approximately what have been found necessary in practice in France.

For the sake of operating in narrow places rather than of turning around in a smaller circle it is necessary that steering to an extreme angle be allowed for. This turning circle limits the frame width and it could be best specified by standardizing the width of frame of Class "A" truck as 33 in. and the width of frame of Class "B" truck as 34 in.; these agree with the standard widths of rear spring seats and permit the use of a uniform 26-in. engine arm.

The standardization of tire treads is important. The front tires should be the same gage on center lines as the rear tires rather than have the front and rear tires line up on their inner edges, as this makes steering difficult and rubs the inner edge of the front tires. This construction is called for in the Class "A" United States specifications.

Engine Details Should be Improved

The engines of American trucks in France often gave trouble from the fact that they were not sufficiently run in before they were put into hard service. The engines must be of a heavy-duty type designed and balanced so that the truck can be run at a continuous speed of 20 m.p.h. on high gear in emergency.

The war has developed more improvements in engine details than in general design. Plain bearings without oil grooves have come into much more general use. The use of floating piston pins and floating connecting-rod upper bushings has also come to stay. Many fixed piston pins in engines giving serious trouble have been replaced in the field with floating pins,

which have plain cast iron stoppers to prevent the steel pins rubbing the cylinder sides.

Valve push-rod roller pins have also been replaced in the same way with floating pins, and in general the lesson has been learned that for heavy service a floating pin or bearing is not only more easily replaced in the field, but shows much less wear than a fixed surface with concentrated pressure on one point.

The rear bearings of engines suffer considerably from the overhanging weight of clutches and universal joints and from the pressure caused by the non-alignment of annular bearings with engine bearings in the case of inclosed unit clutches. The latter trouble is especially evident when the engine bearings have been re-scraped and taken up, and occurred to such an extent that I am convinced of the need of the complete separation of the clutch from the engine unit. The universal joint can then be brought up close into the flywheel, which in turn should also be carried well forward so as to overhang the rear bearing as little as possible.

The removable head cylinder block is receiving considerable attention from European engineers on account of the advantage of completely machined surfaces, the need of cleaning after continued service, and the ease of grinding the valves. In at least two new designs an overhead cam-shaft and valves are being used in conjunction with a removable head.

Pistons without ribs and with more liberal bearing surface above the piston pins are in evidence. In some cases repair pistons have been made with one of the rings down close to the piston pin in order to allow of more bearing surface above. The increased surface allows more liberal clearances and tolerances in replacing pistons in worn cylinders and materially decreases piston knocks.

Engines Require Three-Point Support

Three-point support of engine is necessary: the supports should not be over 26 in. wide on account of the need of narrow frames to allow for the small steering radius. The supports of all sizes of engines should be the same, as it is necessary sometimes to use a larger engine in a special-purpose truck.

It was noted that many valves broke in the part recessed for the valve-spring retainer. Many of the foreign engines have a recess ground to a curve to avoid sudden change in section, as it is impossible to allow for a proper fillet except with a large valve stem. The bearing-surface areas of overhead valve mechanism parts are seldom liberal enough. Here again floating pin and ball surfaces show less wear than fixed surfaces.

Adjusting nuts on valve lifters or valve stems do not stand up under the repeated hammering of war service; the best way is to provide small caps that cover the valve stem ends and hold thin stamped shims for adjustment of the clearance.

Valve springs on certain makes of engines break without apparent cause. On these the trouble was often removed by making taper springs, which would indicate

that the breakage was due to vibration set up in the spring itself.

The marking of the flywheel often causes confusion in the setting of the valve timing, etc. No marks other than the top dead center of No. 1 cylinder should be put on the flywheel.

The holes in both upper and lower ends of connecting-rods should be ground to accurate size and surface after heat treating. These were a source of trouble with most American and many European engines.

Three-bearing crankshafts for war service should have main bearing and crankpin diameters equal at least to one-half of the cylinder bore. The length of all bearings should be greater than their diameter and care should be taken to minimize the leakage of oil from the ends by the omission of all oil grooves and continuous relief at the parting line of the two halves of the bearing.

Lubrication Systems

Pressure lubrication to all main crankshaft, crankpin and camshaft bearings is absolutely essential. Pressure lubrication to piston pin bearings is not necessary if a floating bushing in the top of the connecting-rod and a floating piston pin are used.

Better lubrication of fan and auxiliary bearings is necessary. Care must be taken that oil overflowed onto gears or other parts does not rob the lubrication of any bearings. It is better to have the system overflow through a weighted valve, the stem of which acts as a pressure indicator. Pressure gages are absolutely unreliable and useless in this service, except for temporary connection during an engine test.

Oil filters are a constant source of trouble and their capacity is never half enough. The best filter in service has six vertical removable coarse-mesh screens in series in a side pocket bolted on to the lower crankcase. The removal of the pocket permits thorough cleaning and also provides a liberal handhole for washing out the case with a steam and kerosene jet.

No piping connections or loose tubes should be used on the lubrication system. The flange support of the oil pump and other parts should contain all the connections and have a tough gasket. After all drilling is finished, all piping should be made part of the case by pressing large externally ground steel tubes with a stepped fit into long reamed holes.

Oil-level indicating blades should be notched on the edge to show the amount of oil in the case and marked with three lines indicating "high," "normal," and "low" oil levels, regardless of quantity.

All brass bearing-shells should be finished with a threaded surface before the bearing metal is applied, so that the points of the thread come within a few thousandths of an inch of the surface of the bearing. Most bearings sent from America have too thick a babbitt coating to conduct the heat properly from the wearing surface. Many of the shells are drilled or punched full of holes before being babbited.

The French have made much progress since the beginning of the war in the de-

velopment of variable venturi-tube carburetors without spring air valve or other moving parts. On one type the jet is lowered by the opening of the throttle to prevent backfiring with a lean mixture and the balance restored when the gasoline head in the well is drawn down by the suction of the engine. Much trouble has been caused by the use of small screws in brass castings of carburetors, and even by the breaking off of lugs from the castings.

In the main, the economy of American engines is poor because the mixture has to be kept on the rich side to guard against backfiring. This is made worse in practice by the constant weakening of springs and the sticking of automatic working parts on account of the dusty conditions during convoy driving.

Ignition systems need cleaning up in their small details. There is little choice between a good magneto system and a battery type system. Both give more trouble with condensers than with their main essentials, and both suffer from poor wiring. The development of a wiring system that is completely mounted on a fiber rod or other support, and that can be taken off by undoing a couple of clips, would be a great advantage. The plug connections should press down on top of the plugs in such a way that they can be swung to one side for the removal of a plug. The magneto or distributor connections should come to their proper place without having to trace the wiring. Magneto couplings should only connect one way and should be entirely independent of the means of adjusting the advance.

Water pumps should have more liberal packing glands and should use only woven packing cut $\frac{1}{4}$ in. square into single rings for a standardized shaft. Pumps should be arranged for repacking without removal.

Good mufflers are scarce in France; much work should be done to produce a stronger and more easily cleaned muffler that is worth putting together the second time. The normal type is useless under service conditions.

Gasoline Supply System

The gasoline system is a difficult problem. In general the simplest possible tank system is best and two medium-size tanks are better than one large tank with reserve capacity. A tank under the seat is difficult to inspect or repair but anywhere else it involves a troublesome pressure or vacuum system. All such systems have given trouble in service and probably the best plan is to place two separate removable tanks under the seat in such a way that either one can be easily removed in case of trouble. The type of tank that has given best satisfaction is pressed in two similar halves with a flanged and lapped joint horizontally around the center. The tank is supported on a wooden runner for the whole length of the flange on one side and on a short wooden support on the other; wooden wedges are driven in to hold down the flanges. To remove the tank it is only necessary to open the side door of the seat, drive out the wedges, disconnect the supply pipe, and draw out the tank on the wooden runner under the flange. A similar method can be used with

a round drawn tank by fastening it with bands or supporting it in a tapered hole lined with brake lining at the inner end.

The piping from the two tanks should be independent with a shut-off valve on each end of both pipes. The pipes themselves give trouble. They should be $\frac{1}{2}$ in. diameter and could with advantage have woven on the outside some material that would prevent crystallization.

Very large filters with settling chambers should be used; they should be supported on the frame halfway between the tank and the carburetor at the lowest point of the system.

A large filler opening should be provided on all tanks for filling and cleaning purposes. This should be as near the center as possible to enable the hand to reach to all parts of the tanks.

Gasoline is handled in France entirely in rectangular 2-gal. cans. These are easily carried in their original sealed form as reserve. After they are emptied the cans are used at the front for handling water in the trenches.

Water Cooling System

Individual plain and finned tubes are very much in evidence in radiators on account of the ease of repair of this construction. Large tank-capacity is necessary, especially at the top of the radiator. Flange or union joints are necessary to enable the radiator to be quickly removed without disturbing the hose connections.

Hose connections should be large, because the rubber on being heated swells on the inside and obstructs the passage. There is need to develop a type of hose (without the insertion of a wire spring) that will not collapse on the suction side.

Fans should be large and their speed should not be too high. Fan bearings and belts are a common trouble. It is worth while arranging a proper mechanical drive to the fan as part of the engine front drive, as it is always a choice between heating and belt trouble with too loose a belt and bearing trouble with too tight a belt. With a mechanically-driven fan a spring drive-clutch is absolutely necessary.

Practically all starter trouble is with the overrunning clutches or with the flywheel gearing. The motors themselves and the batteries, when they have received proper attention, have given better service than would be expected.

All lighting should be arranged on the single wire system with interchangeable single-point lamps and with none in series. The tail-lamp should show a light sideways on the ground for inspection from the driver's seat.

Normally 2-cp. bulbs are used in all lamps with an 8-cp. in the searchlight. The lamps are in service only when the trucks are away from the front. In a fog it is necessary to use 8-cp. bulbs in all lamps, as convoy driving is then very difficult.

Spare lamps of both sizes should be installed on a covered panel with blind sockets on the dash. All lamps should be flexibly connected to sockets, on the dash or frame, which are identical with the lamp sockets, so that they can be used for testing and can be used in these sockets instead of in the lamps in case of accident. It is necessary to install a tail-lamp on

each side, both for driving in England and as markers for a standing park of vehicles on the side of the road.

When interchangeable lighting is used the electrical equipment and wiring should be readily removable as the heat of the lamp soon destroys the wiring.

No instrument or dash lamps should be used. When it is necessary to see any dial on the dash it should have white luminous figures on a black background. Only flexible metallic armored conduit should be used.

All fuses should be double ordinary capacity and the circuit should be protected also by a grounded vibrating circuit breaker.

Frame Design Important

Only straight parallel uniform section side rails should be used and these should be of very liberal size, especially in the width of the flanges.

Pressed steel sections are preferable to rolled structural sections as they permit double row riveting of gussets without drilling near the edge of the frame.

In practice it is often necessary to cut out loose rivets and replace them with riveted-over bolts; with rolled sections the tapered flanges do not provide a square seat for the bolt heads.

The width of the frame must be standardized to harmonize with axle seats and engine supports and to allow of the specified turning radius with the specified front-axle tread.

All cross members should have large integral gussets which should be fastened to the side members in a staggered double row of rivets.

Frames should be as low as the clearance over rear axles will allow, because with flat springs it is difficult in any case to make the front-spring brackets short enough. Long spring brackets will not stay riveted to the frame; the rear brackets especially of the front springs gave trouble and they should be as short as possible, even if the shackles have to be in compression.

Open towing-hooks on either the frames or the towing lines give trouble. The frames should be provided with closed towing loops and the towing lines with strong yoke and chain ends.

Frames should be filled with oak blocks under the second cross frame of the body from each end and holding-down bolts should clamp round the frame at these points. These bolts should only hold the body down, separate means being provided for locating the body in position on the frame.

Accessibility of Steering Gear

There was considerable trouble in removing steering gears from the frame and in removing other units without disturbing the steering gear. The steering gear is located farther out from the center-line of the truck than is usual on account of the wider three-passenger seat. The best position of the steering gear is on top of the frame, supported in a bored-out bracket riveted to the top and outside of the frame with the steering-arm directly outside the frame.

If the stem of the gear is supported in a stamped ball cup in the center of a re-

movable plate on the footboard the steering gear can be lifted out at any time without taking it apart and without disturbing anything else. It is also out of the way of engine arms and allows the engine to be lifted or slid forward for removal. It also helps make possible straight steering connections. The steering-gear shaft should not be allowed through the frame or anywhere else where it has to be taken apart to be removed or for the removal of any other unit, as during quick replacement of a unit in the field it is often impossible to take apart a damaged or jammed steering gear.

In practice, with the low reductions necessary for service, the four-speed truck is normally started on second gear, which corresponds to the low gear of a three-speed transmission. The low gear and reverse are only used for maneuvering so that it would be an advantage if the control position for both of these speeds were inside the separate latched gate. This would make it possible to rock backward and forward in a tight place in a way not possible when the reverse position only is in the separate latched gate.

Requirements for Bodies

All bodies should be wide enough to cover the rear tires so that mud will not splash on to the sides and be carried up under the cover into the body. If the treads of rear tires are standardized the bodies of both Class "A" and "B" models should be the same width. Bodies should be built as low to the ground as possible to assist the unloading by hand of heavy ammunition boxes.

The body parts should be strictly interchangeable. If sides are removable they should be fitted with stakes projecting both up and down to permit the placing of the side either way up. All of the side pieces should be absolutely interchangeable in any position either way up.

Tail-gates particularly have been bad in detail. They should be made of hardwood, preferably white ash, not less than $1\frac{1}{2}$ in. thick. The best form of hinge is made by using a piece of 1-in. standard pipe with 3-16 by $1\frac{1}{4}$ -in. strap iron bent round the pipe and extended up both sides of the gate to the top. The two straps are then bolted through, using the wood of the gate for a filler. No forgings are necessary and the strap hinges provide the necessary steel runners on the surface of the gate.

Floor boards should be uniform and each board should have a steel strap runner on the center line. The boards should be protected with a thin steel U-plate, which should be riveted down and the board handled as a complete unit. The cutting of trapdoors in the floor is unnecessary, because the transmission and other units have to be examined and cleaned while the truck is loaded. In reserve supply or ammunition columns especially the loads may remain in the stationary or moving trucks for weeks at a time. In normal operation the load is likely to be delivered to the first-line horse transport after dark, the truck then returns to the rail head for refilling as soon as possible and probably does not again deliver at the front until after dark the next night. Therefore all trucks should be designed to facilitate re-

pairs and inspection while the body is loaded.

The body covers are a difficult problem. On British trucks they are carried on front and rear angle iron couches with longitudinal wooden purlins supporting the canvas. This system holds too much water on the top and it is common to see intermediate purlins added by the men themselves. The continuous bent-wood bow on the prairie schooner system appears to be the best. All bows should be interchangeable and the ends should be protected by metal U-plates riveted on. The rear front flaps of the cover should be independent of the main sheet.

Bodies should be fitted with ample accommodation for the kits of four men and for tools, shovels, crowbar, axe, jack and tow rope.

Painting of Bodies

All trucks at the front are crazy painted, which means that after they are painted a khaki color they are daubed irregularly with various colors to break up the surface and make them less conspicuous.

The clutch should not overhang the engine bearings, and its annular bearings should not line up with the scraped-in engine bearings. Its operating mechanism should be supported on its housing and should be much better lubricated than usual. The troubles are mostly in the operating mechanism and in all types are exaggerated with the wear of the clutch surfaces. Except in the details of each particular design there is little to choose between the cone, three-plate and multiple-disk dry types.

I can see an enormous advantage as regards service and quick replacement in a truck comprising an engine unit with a double universal-joint directly behind it, a rear axle with a propeller-shaft and universal-joints directly ahead of it, and a center unit combining all of the clutch, transmission and operating mechanism. I first studied these details in the construction of a German war truck in 1911, but I did not realize their advantage until I had seen actual war service. Since only annular ball or roller bearings are used, there is no difficulty in properly aligning the component parts.

Location of the Clutch

The complete unit should be supported on three points for the same reason that the engine should. I have laid down the lines of such a truck and a number have been built from standard component parts, which were intended for the normal type of construction. A double-woven disc universal-joint was used between the engine and the front of the clutch and transmission unit. The unit consisted of a front case and a rear case connected by a flanged tube. The front case contained a standard multiple-disk clutch, the clutch-operating mechanism and the gear-shifting mechanism. The brake lever was also pivoted on this case. The rear case contained nothing but a standard four-speed transmission and the shifting forks. The drive-shaft between the clutch and the transmission was housed in the flanged tube between the two cases. All of the

parts used, except the two cases and the connecting flanged tube between them, were standard production of the parts makers. The results have been fully up to expectation and much better than with a truck having a clutch combined with the engine.

A clutch and transmission unit implies a lubricated clutch with all of the operating parts running in oil. From the great trouble with clutch-operating mechanism I can foresee the development or rather the revival of the wrapping clutch, properly lubricated and encased.

Clutch-Pedal Movement

The wear of multiple-disk clutch surfaces is much smaller than that of the surfaces of the plate or cone types, but owing to the number of disks the slightest wear produces just as much increase in the clutch-pedal movement as with the other types. The pedal lever soon comes in contact with the floor-boards and in ordinary constructions any readjustment of it affects the clutch brake. Practically the only remedy is to add clutch disks up to the original thickness or to insert a collar behind the thrust bearing of an equal thickness. Some companies have compressed all faced clutch-disks under a heavy hydraulic press before assembling, which to a certain extent lessens the trouble.

After carefully studying universal-joint troubles I am convinced that woven-disk universal-joints will supersede the metallic lubricated joints ahead of the transmission and that they can be designed to give equal satisfaction behind the transmission, even with the large gear reduction demanded in war service. I have examined many of the lighter leather joints which gave good satisfaction in London omnibus work but afterward failed in France, but the advantage of not needing lubrication and the actual success of later joints cannot be doubted.

With either type of joint the length of the propeller-shaft and the angularity of the joints should be limited as much as possible by good design. The weight of the propeller-shaft should be decreased by tubular construction.

In any lubricated type of joint, leather covering should not be depended upon to retain the lubricant, but only to prevent dust and foreign material from accumulating upon moving parts of the joint.

Results With No Differential

Some form of limited differential action is necessary. The truck with a free differential is hopelessly mired whenever one wheel drops into a hole. A standard spiral differential was thoroughly tested, but it was evident that the design was not heavy enough for the severe service.

Many trucks were run without differentials. These gave surprisingly good results and instead of decreasing the tire mileage, as would be expected, the mileage appeared to increase. This could only be attributed to the decreased slip of the wheels on the granite block pavements and in the mud and holes nearer the front. These trucks would pull over almost impossible places and were the best evidence of the need of limited action.

Other trucks were similarly fitted in Canada and used in the construction of camps

with similar results. These trucks had a 156-in. wheelbase and I have driven them on asphalt streets heavily loaded without being able to detect the absence of differential action.

Front axles of the reversed Elliott type are rapidly replacing the Elliott type in new war-truck designs. This is due to the need of lower spring seats and higher steering connections, and to the demand for straight steering-knuckle tie-rods. The ordinary axle is dropped in order to lower its center and give clearance under the engine. The tie-rod is similarly dropped. To do away with the drop it is necessary either to raise the engine or to lower the spring seats. Raising the engine spoils the design by increasing the angularity of the drive and by raising the floor of the truck. It also prevents the use of an internal-drive axle in place of a worm axle; a layout giving absolutely straight-line drive to a worm drive results in an angularity of the drive to an internal-drive axle of all that can be permitted. To remedy this by dropping the axle seats without raising the engine means an axle with at least 3½-in. drop from the center of the wheels to the spring seats. Few Elliott type axles have this drop and if they have it, the steering-arms are bent considerably so as to make them a proper height for a straight steering reach. The reversed Elliott satisfies these conditions much better.

Improved Brakes Necessary

Brake design must be more liberal and much better in detail. Brakes give probably as much trouble in not properly releasing as from any other cause.

Both the cam or toggle-operated segment and the full wrapping brake give good service if the details are well worked out. The former, as a rule, have segments too long to permit the best operation, as the ends do not bear in the direction of the applied pressure and decrease rather than increase the braking action. Most of the latter are not well enough supported and centered in the released position to prevent rubbing against the drums with consequent heating and wear.

Brakes must be much better enclosed and protected from the mud and dust. I have seen standing vehicles splashed on exposed brake parts until it was necessary to remove the wheels and thoroughly clean the parts before the vehicle could be operated.

Many trucks and cars have fair service brakes and inadequate emergency brakes. In France it is necessary to be able to slip the wheels with either set of brakes without exertion.

In general the brake levers should be longer and have more movement than is usual to allow smaller stresses in the rods and especially in the threaded adjustment points. They should be so planned that, without adjustment except for the applied position of the pedal or hand lever, all of the levers and parts will, until the brake band is worn out, be approximately at right angles to the pull when the brake is applied.

All trucks sent from Canada were fitted with demountable tires on standard S. A. E. rims. This was decided upon before the British had adopted the American

pressed-on type with a view to easy replacement in the field. Two makes were used in approximately even quantities. On both makes the locking rings and bolts and nuts were thoroughly galvanized. Most of the tires were carefully shipped fitted with wooden center struts to prevent distortion of the rims. Ample spare tire parts of all kinds were supplied.

Tire-Replacement Difficulties

The subsequent use of these tires on the muddy roads in Flanders showed that they were much more difficult of replacement than the pressed-on type which is now standard on all British trucks. After the tires had been in use for some time in the mud they were removed only with the greatest difficulty, and once the rims had become rusted it was often impossible to remove them, even in a tire press. The most effective way was to take out the remnants of the rubber and to jar and expand the rims with a sledge hammer.

The tires of the pressed-on type on the contrary were easily applied and removed in a tire press, which was always to be found at every tire store. Tire presses also were fitted on railway cars, which were always available at railhead points with a stock of tires. As the main function of the motor trucks was to ship material and supplies from these same railhead points this method of replacement was very simple.

Spare wheels with tires applied were always available at more advanced points, but these were necessary in any case to guard against the breakage of wheels and were easily used if there should be an emergency case of tire trouble in the field. Tires were almost universally pressed on with burlap strips. This was at first criticised, but it did not appear to cause any trouble, as with the general muddy condition it probably aided in the quick rusting on of the tire.

The standardization of the pressed-on type of tire on S. A. E. rims cannot be too strongly recommended. I am satisfied that the demountable type will be found wanting in war service in France.

Advantage of Single Tires

It is advisable to limit the number of sizes of tires to as few as possible. For front wheels of all trucks 5-in. can be used because the smaller trucks are naturally faster moving and the additional speed will easily make the wear even. In France a great many of the trucks are used with 5-in. dual tires on rear wheels. These developed serious troubles on account of the load often being concentrated on one of the tires only. On the granite block roads a projecting block on a damaged road would often cut out a large section of one of the tires. On heavily cambered roads the weights would concentrate on the inside tires. I am convinced that the wider-section single tires on rear wheels suffered less damage from these causes than the dual tires. I believe that tires with a slightly convex tread give better service than absolutely flat-tread tires. Many of the tires sent from America to France appeared to be over-cured. In general they were harder and more likely to crumble than the European tires. On the other

hand, many of the more resilient tires gave trouble near the base and became detached from the steel ring.

Cast steel and pressed steel wheels are rapidly replacing wooden wheels. These should be finished on the outside to S. A. E. standards for pressed-on-tires. The hubs should be standardized so that all makes of ball and roller bearings are interchangeable in them. The use of a separate flanged hub makes too heavy a construction. In general the smooth disk is preferable to the open spoke type on account of the muddy road conditions.

Preferred Spring Construction

Springs should be flat under load in both front and rear. Springs with not less than three reverse leaves and with a straight main leaf give the best service because the recoil on bad road surfaces is less. Several springs without spring eyes, pivotal fastenings or shackles have been tried with success and combined half-elliptic and cantilever springs are in use. The development of these makes possible the use of leaves of uniform thickness and length and promises to have a bearing on future production. Springs with a slow period are necessary and are worthy of considerable study.

Several methods of avoiding bolts through the center of spring plates have been devised. In one an additional spring clamp is used in the center of the spring seat, with a small pressed projection on each leaf. In another the ordinary clamps are used through a plate which goes on top of the spring seat for the purpose of holding the spring leaves assembled. The spring seats are counterbored to accommodate the clamping nuts.

Continuous round clamps over a semi-circular saddle block are preferable to those having square corners.

The spring shackles at the rear end of the front springs should be in compression to allow of short brackets on account of difficulty in riveting them to the frame.

Although the use of rubber or spring bumpers to limit spring travel is advisable, no bumpers of present construction give satisfaction. Some with much more liberal proportions should be developed.

Whether oil or grease is used, the lubrication should be taken care of in the pin itself; projecting oil and grease cups, whether screwed in direct or through elbow fittings, are constantly being broken off or lost. If a lubricating hole is uncovered for a mile the grit will enter and cut the parts regardless of the lubrication method.

Axle Drive Must be of Sturdy Design

There is no objection to a liberally proportioned Hotchkiss drive through flat springs with recoil plates; in fact, this system properly designed has many advantages. However, many Hotchkiss drives gave trouble and so did many of the drives with radius-rods and torque-arms. With the low gear reductions used in the transmissions the wearing and bearing surfaces in the driving details of any system must be of liberal area. In every case that I investigated I placed the trouble on the details rather than on the system used.

The same thing is true of the various systems of mechanical drive to the wheels.

All of the enclosed systems used gave success or failure according to the details of design. The chain drives were for the main part unprotected from mud and sand and so were working at a great disadvantage. A few were enclosed, but these suffered through inaccessibility. Under ordinary conditions the chain drive vehicles were efficient and easily maintained. The severity of the service and the bad weather conditions have finally ruled against the chain drive in favor of the fully enclosed types. In the newer designs the worm drive, double reduction gears and internal drive gears have entirely superseded chain drives.

In the best organized mechanical transport companies a careful mileage record is kept not only of each truck, but of each unit in the truck. This is used as a basis of inspection, cleaning, lubrication and repair. The record systems vary, but are mainly based on semi-daily reading of the hub odometer, checked by a calculated distance according to the service done. For instance, the connecting-rod bearings will be inspected after a definite distance and be taken up if they show the slightest need. All of the units from the engine to the rear axle are washed out on a definite mileage basis. All companies have a proportion of reserve trucks and the ones to be worked on are placed in this reserve.

New trucks are numbered on the frame and on each of the units, as well as on the body, and the service of each unit is separately recorded. Recognized number plates should be provided on the cases of each unit.

The hub odometers used could be much more liberally designed; the means of driving from the axle spindle particularly gives trouble in almost all cases.

Tools and Accessories Should be Few

In any truck it is an advantage to limit the number of tools necessary for ordinary operation. This is especially true of a truck for war service. Tools should be non-adjustable as far as possible. Several trucks in France are limited to the use of four sizes of bolts and nuts and one gets along with three. To handle four sizes needs but two double ended wrenches. The wrenches have an end socket and two side sockets set 15 deg. apart at each end; the small end of the large wrench fits the spark plug. Only socket wrenches should be allowed. The smallest threads used should not be less than $\frac{3}{8}$ in. and these should not be used when there is any risk of twisting them off. The strength of a 200-lb. driver has more to do with breakages than the actual strain on a bolt in service. Only the best hand tools should be supplied. The ordinary \$3 set of tools in a canvas case is useless and never gets replaced. Tools should be standard for the whole service and should be bought in quantity from the tool makers and not with the vehicles.

The same is true of jacks. The average jack is useless; in the mud it is hard to maintain the best ratchet type jack. Stout bottle screw jacks in two lengths are the most practical. When a truck is mired it is impossible to use the jack except under the frame. To do this it is necessary to carry short lengths of plank and chains

with strong yoke-ends to chain the rear axles to the frame. Each truck must carry a sledge hammer, an axe, a crowbar and a shovel.

A first aid truck and relief trucks accompany all truck convoys. These trucks run the last in the train and stop and help any truck that falls out of the line. If necessary, a relief truck will tow the straggler or take its load so that the first aid truck can work on it. The traffic is arranged so that one class runs on each road and to a great extent in one direction only in order that vehicles pass one another as seldom as possible. The ordinary motor truck route is from railhead toward the front until the roads are too bad and the loads are delivered to the smaller units of the horse transport. The truck then returns to the railhead by another route. After they are reloaded they proceed again toward the front.

Where Repairs Are Made

Somewhere on the route their rest camp will be situated. This location is chosen in as sheltered a spot as possible and it is moved whenever German guns or airplanes become too friendly. Here the reserve first aid truck, the workshop trucks and the stores trucks carrying supplies and repair parts are left working on the reserve trucks and units. The repairs done here are limited to those requiring two days' work on any one unit. If engine bearings need scraping in slightly and tightening, this would be done, but if parts were broken, the unit would be taken to railhead, shipped to the advanced base and another drawn in its place.

This work has to progress regardless of weather conditions, and all workshop, store and first aid trucks should be provided with a rolled-up canvas shelter on a heavy roller on each side with suitable struts for the support of the roller. These shelters also are used as the headquarters office of the company, in which all of the clerical work incident to ordering parts is done.

It is necessary that each company shall be provided with adequate parts lists and as far as possible with bound loose-leaf books of photostat reductions of the drawings of the trucks used.

The workshop trucks are fitted with machinery for small emergency repairs, although most of the repairs should be accomplished with standard finished parts. With trucks of European manufacture, the machine shop feature is more necessary than with interchangeable parts of American manufacture.

The machinery is mostly electrically driven and the current derived from the small direct driven sets is also available for lighting. The store bodies are fitted on each side with steel bins with inclined bottoms for holding the small parts.

Ambulances and Special Vehicles

Ambulances are for the most part on long frame, specially built touring car chassis. The bodies are 8 ft. long and must not overhang the rear axles more than one-third of their length. To accomplish this, a wheelbase of about 145 in. is necessary. The bodies carry two drivers, an attendant and four stretcher patients or

eight sitting patients. With sitting patients, one-third of the weight of the patients and of the other three men is distributed between the two axles; the other two-thirds of over 1600 lb., is carried directly over the rear axle. This means that a load greater than that due to the weight of eight men and their equipment, or a load of over 1600 lb., is carried directly over the rear axle, this being exclusive of the body weight.

The sizes of ambulance rear axles, springs and tires have had to be increased to stand the load. Ambulances are mostly fitted with dual pneumatic rear tires on account of this. Incidentally, the dual rear tires improve the traction about as much as an ordinary locked differential, and ambulances so equipped surprise the average driver by their ability on bad roads.

All ambulances are designed with a center aisle and a seat for the attendant on account of the number of serious cases requiring these facilities. The average ambulance is very uncomfortable for sitting cases. The best arrangement is to leave the seat in position for the lower stretchers and to hinge the back upward for the upper stretchers in the opposite manner to the ordinary upper sleeping car berth. This arrangement provides a comfortable seat for

sitting patients and also a pad under each stretcher to take the weight of stretcher patients when the ambulance strikes a bump. The side rails of the ordinary stretcher spring and the canvas sags uncomfortably without such a support.

Steel runners for the stretchers should be channel-shaped on one side only and flat on the other to allow for variation in the width of the stretchers, as the stretcher stays with the patient to the end of his journey.

Special Bodies Can be Interchangeable

Box or panel bodies of practically the same type as an ambulance body are used on the same type of a chassis and might just as well be interchangeable with it except for the internal fittings. These bodies are used for light service, such as mail, officers' mess-cars, motorcycles, carrying machine guns, or for ammunition cars. Their loads and speed requirements are about the same as those of an ambulance.

Special officers' bodies, some with sleeping arrangements, are also fitted to these chassis. To my mind they are better suited to the severe service than are standard touring cars. There is also the advantage of fewer types, which should be the army automotive engineer's slogan.

Mead-Morrison Friction-Drum Winch

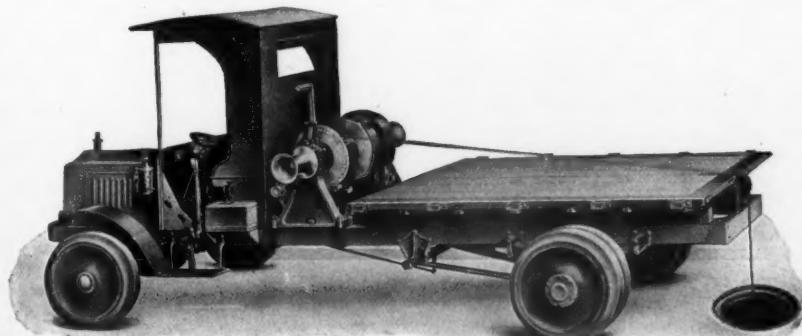
The Friction Drum Winch is specially designed for automobile truck use for work on which it is customary to use wire rope instead of manilla or hemp rope used on capstans and winch heads. This winch is built by the Mead-Morrison Mfg. Co., East Boston, Mass.

For pulling telephone and electric light wire through conduit, it is found that wire rope works to better advantage and although it is possible to use the vertical capstan winch made by this company and which was described in our March, 1917 issue, page 9, for this purpose by connecting the wire rope to a manilla line and only allowing the latter to feed around the winch, yet most of the telephone companies prefer the drum, for it can be used to better advantage in pulling telephone poles, etc., etc. For this last-named use it works particularly well on account of the latched foot lever operating the brake, for by its use the load can be held safely suspended at any point.

This friction drum winch can also be advantageously used for other purposes, such as pulling scraper buckets for back filling trenches, hauling wire reels and machinery on the truck body and for pulling trailers, etc., to the truck.

Specifications of this drum winch are as follows: Rope pull, single line, 4000 lb.; rope speed, single line, 60 ft. per min.; space required, front to back, 27 in.; weight complete, 1425 lb.; drum, diameter, 10 in.; winch heads, diameter, 6 in.; height (top of chassis to center of drum shaft), either 17 or 23 in..

The worm gearing runs in oil, while the friction surface is asbestos lined. The drum, which is independent of the winch heads, is bronze bushed and fitted with asbestos lined brake operated by latched foot lever. The drum shaft bearings are arranged so that the weaving of the chassis, when going over rough ground, will not break the side frames or drum.



The Mead-Morrison Friction-Drum Winch

PERLMAN-FIRESTONE SUIT WITHDRAWN

The Demountable rim patent litigation, which has been carried on by the Perlman Rim Corp. against the Firestone Tire & Rubber Co. was suddenly brought to an end on June 12th, when the case was dismissed by Court without prejudice to either party. The motion for dismissal was made by counsel for the Perlman Rim Corp. If the Perlman concern wishes to substantiate its patent for the purpose of enforcing it further, suits must be brought. The Court decree provides that all exhibits of both Perlman and Firestone be impounded and that all testimony taken in the case just dismissed shall be available for use in any further litigation between these two parties and their representatives. It is said that L. H. Perlman, president of the Perlman Rim Corp., has severed all connection with the corporation.

SWAIN-HICKMAN, agents for the Republic trucks, moved salesrooms to 2116-18 Market St., Philadelphia.

The National Automobile Chamber of Commerce members recently re-elected Charles Clifton, head of the Pierce-Arrow Motor Car Co., to the presidency. Other officers elected were: vice president, Wilfred C. Leland, (Cadillac); Division vice-presidents, Hugh Chalmers, (Chalmers); Windsor T. White, (White), and Herbert H. Rice (Oakland); R. D. Chapin, (Hudson) Secretary; George Pope, Treasurer and Alfred Reeves, General Manager.

John F. Dodge, of Dodge Brothers, Detroit, was elected to the directorate, the others being, Hugh Chalmers, (Chalmers); R. D. Chapin, (Hudson); C. W. Churchill, (Winton); Charles Clifton, (Pierce); J. Walter Drake, (Hupp); C. C. Hanch, (Studebaker); Wilfred C. Leland, (Cadillac); Alvan Macauley, (Packard); Wm. E. Metzger, (Columbia); R. E. Olds, (Reo); Carl H. Pelton, (Maxwell); H. H. Rice, (Oakland); Windsor T. White, (White); John N. Willys, (Overland).

"THE FARMERS' ADVOCATE" states a new era in agriculture in Ontario, Canada, is dawning. Rapid strides have been made in the development of power machinery for the farm and this machinery has been applied successfully on a number of even the smaller farms in this Province. But we are only at the beginning. The farm home will very shortly be as well supplied with modern conveniences as the city home. The farm tractor is getting a boost in Ontario this year and the attention of many farmers is drawn in that direction. Machinery is beginning to do for agriculture what it has done for other industries. We are living in a time when it is necessary that the output of all our agricultural land be as large as it is possible for those on the land to make it. Machinery and modern implements are necessary to greater production. They should be made available to the man on the land at the lowest possible figures, leaving a fair and reasonable margin of profit for the manufacturer, and those necessary to place the machinery and implements at the farmer's disposal.

Boston Has Successful Parcel Service

While Privately Conducted is Substantially Co-operative Delivery

By SAMUEL SAYWARD

CO-OPERATIVE delivery, although conducted as a private enterprise, has been found to work successfully in Boston, where the Clearing House Parcel Delivery Co. has been in operation for the past six years.

Starting as a small competitor of local express companies, the growth of the company has been remarkable so that today its speedy motor trucks reach every household within a radius of ten miles of Boston. Parcels delivered by Boston stores beyond the ten-mile zone are not handled by the Clearing House Co., experience having shown that this business could not be handled to advantage at the small charge made.

Within the radius served by the Clearing House Co. are the homes of more than 1,600,000 people who do a large part of their buying in Boston. This means that more than 18,000,000 packages are handled in the course of a year by the Clearing House Co., with the usual rush seasons to be taken care of. In the summer season the population served remains practically the same, for while many of those who reside within the city limits may go to mountains or seashore, summer residents come to the beaches in the immediate neighborhood of Boston and must be served. The small merchants at the summer resorts require delivery of innumerable parcels from the Boston distributing centers to care for this transient business.

Summer Haul Per Package Longer

Thus the haul during the summer months is, on the average, increased per package over that of the winter when the resident of the city proper does his buying and the delivery may be a matter of only a half dozen blocks from the purchase place. To offset this, delivery in the summer is made more quickly owing to better road conditions and longer daylight hours in which to work. So that the business for the year, except the holiday rush season, remains about at a fixed volume. There is an increase in early and late summer, when people buy preparatory to going on vacations and the arriving vacationists must also be served and again upon the return of the vacationist to the city when he prepares for his winter's supply of necessary small parcels. Sometimes when the season is backward and summer comes suddenly, as it did this year, this business is felt by the company and must be handled expeditiously. At other seasons the fluctuation is so small as to be hardly noticeable.

During the early days of the company's history several distributing stations were maintained. Experience showed that in a few cases parcels would be delayed or the company would be put to considerable expense to transfer a handful of parcels to another distributing station. Gradually the handling of the parcels became

centralized, the business practically adjusting itself so that the less important collection stations were gradually abolished.

With the erection of a big service station for the care of its fleet of motor cars, the adoption of one central collection station was put into effect and it has been found that this can be operated at far less expense and bundles can be handled with much greater rapidity than under the old system of several collection stations.

Every parcel, before leaving a store, is labeled with a paper stating the day on which it was handed to the delivery team operator. A different color label is used by the stores for each day and still another color for perishable matter or other parcels, which, for some reason, a customer is in a hurry to receive.

Colored Labels Facilitate Parcel Handling

Reaching the distributing station these labels are known to all employees and are readily discernible, facilitating the handling of the goods.

The distributing station now occupies the roof or second floor of the garage and is fireproof in construction, the same as the ground floor. The large motor trucks, capable of handling a 2-ton load, which collect the parcels from the downtown stores, are driven up a runway to the roof or second floor, and deposit their loads on a raised platform. From this platform other platforms lead out in a sort of fan shape and at the ends furthest from the delivery platform are several cage-like stalls, made of heavy wire fencing.

Each one of these cages represents a city or town or section of a city or town, according to the amount of business handled in that locality. The cages are geographically arranged, so that as the business increases in one town during the summer months, added cages are available, or when business diminishes, one lighter delivery truck may sometimes take the load formerly carried by another distributing truck.

The trucks loading and leaving the central station for the outlying districts to deliver the parcels to the customers are smaller than the collecting trucks and are capable of traveling 30 to 35 miles an hour, being constructed on touring car chassis. Very few of the trucks have solid tires, practically all having pneumatic tires and traveling at the same speed as would be maintained by a pleasure car in the district traversed.

The delivery trucks also reach the roof or central station by way of the runway, but they pass around the end of the receiving platform and along the outside of the series of fan-like platforms to the cages, where they are quickly loaded by the drivers—these being men familiar with the streets in the locality served by that particular truck and where the proper packing of the parcels in his delivery car

means greater efficiency in handling the parcels when he reaches his destination.

The company handles the greater part of its business by contract. The contract is more or less flexible, the number of parcels figuring largely in the terms made. With some concerns where bulky material is handled, the charge is greater than with the department store where many parcels are small. With other concerns, where the parcels handled run much heavier than the ordinary merchandise, special arrangement is made in the contract to cover this extra tonnage.

The general average used in making contracts is that of department store merchandise. If a concern desires delivery of goods which will run heavier than this the charge is increased and also if the parcels will run bulkier. Practically no time is wasted by the company in weighing parcels, except in unusual instances, as this has been found to be the most costly method of handling the business, requiring additional clerks and much additional bookkeeping.

CORRECTION

IN PUBLISHING THE BIDS ON TRUCKS TO BE PURCHASED by the Government in our last issue, we inadvertently omitted those of the Maccar Truck Co., of Scranton, Pa., and the Dart Motor Truck Co., Waterloo, Ia. Same are given herewith. Maccar Truck Co.'s bids:—Model L, Class A, chassis price, \$2250; with additional equipment, \$2306.50. Model M, Class B, chassis price, \$3400; with additional equipment, \$3458.50.

Dart Motor Truck Co.'s bids:—Agrees to deliver at the rate of 100 trucks per month, which could be increased to 50 trucks per week conditional upon the company's ability to get additional material. Prices f.o.b. Waterloo on Class A chassis without bodies, 200 to 1000, \$3068 each; 1000 to 5000, \$2975 each. Boxing charges for export, if required, \$85 each.

THE UNITED STATES RUBBER Co. and its subsidiary, the U. S. Tire Co., New York City, is working out a plan whereby its employes, both women and men, are now eligible for pensions. According to this plan a liberal pension is available for every employe who has been in the employ of the company for 20 years or reaches the age of 65 in the case of men and 60 in the case of women. In certain cases, men may be pensioned at the age of 60 and women at 55. The amounts are calculated at the rate of 1 per cent. of the average paid during the last 10 years of service multiplied by the number of years. In no case will the amount be less than \$240 nor more than \$5000 a year. This pension will not come out of salaries or wages. It is given as a token of faithful and loyal co-operation.

Transportation Versus Speed

An Argument for Slow-Moving, Heavy-Duty Trucks as Most Economical

By FREDERIC WM. UNGER

[The author is plainly not on the popular side, but he has made a strong case for the slow-speed truck. If any can detect fallacies in his contentions or can confirm them we shall be pleased to publish their views also. The subject is important enough to deserve discussion until the full truth is established as to what is the best speed for heavy-duty trucks.—Editor.]

IN LIGHT delivery commercial cars speed is a most important element in what the purchaser needs and buys. It should be distinctly understood that the following arguments apply only to the consideration of heavy-duty motor truck use.

Let us assume that for heavy hauling the item of high speed be eliminated, and consider what else may be desirable from the motor truck purchaser's point of view.

Compared with team use the important elements are as follows: Transportation, greater radius of action or distance; endurance, reduced cost, convenience and greater capacity.

As to the element of speed let us assume it to be the same as that of horses—three m.p.h. with load and six m.p.h. without load, an average rate per hour of four miles.

Now let us consider what the purchaser gains over teams by using a motor truck which only travels at team speeds.

In ten hours' going time the distance covered would be 40 miles, which is twice the distance capacity of a team, resulting in either double radius of action or the work of two teams at team radius of action. Transportation is therefore doubled in capacity or distance.

Also the teams would be tired out, but with another driver, the truck could go on another working shift if required, so endurance shows a gain of 100 per cent. over two teams or 200 per cent. over one team.

Now as to costs. In pleasure cars or commercial trucks the formula, "Cost increases as the square of the speed," will be found to work out pretty accurately both as to first and operating costs. As to first cost the formula should be "Cost increases in proportion to the square of the maximum speed capacity."

If this be true the low speed under consideration for motor trucks should, if applied, bring about a striking saving in the vital element of costs.

Provide a Third the Usual Speed

We are assuming a truck with a maximum speed of 6 m.p.h. in comparison with a motor truck with a maximum speed of 18 m.p.h.

The latter travels three times as fast as the former. The square of 3 is 9. The obvious deduction is that all costs of the 18 m.p.h. truck would be nine times as great as the costs of the 6 m.p.h. truck.

If the 18 m.p.h. truck is used, at most its efficiency would be only three times as great as the efficiency of the 6 m.p.h. truck.

But if the cost is nine times as great, it is a grave question whether the increased cost incurred for the sake of the single element of greater speed is not out of all proportion to the extra speed's value.

Further, we must consider that the actual speed realized in daily practice by the average motor truck is only about one-half of the speed capacity provided for, while the costs are approximately as great as though the full speed capacity is realized.

So the actual comparison is that only twice the efficiency over the low-speed truck is realized by the high-speed truck while the costs still remain nine times as great.

From this point of view the low-speed truck begins to have a powerful argument in its favor—for in many lines of industry the hauling problem is that of transportation and cost, with the time element a negligible quantity in comparison.

Low-Speed Truck Equals Four Teams

Returning to comparison with teams the low-speed motor truck, having double the distance capacity of a team, could also have double the load capacity, so that the net gain in hauling capacity would be four times that of one team or equal to the hauling capacity of four teams.

This is assuming that both teams and the low-speed truck operate at their average speed of 4 m.p.h. for ten hours per day. As the time, which may be required for loading and unloading reduces the working hours of the truck, the comparison in its favor will be slightly modified.

It is to be expected that these ideas will meet some opposition from those who have been selling trucks of comparatively high speeds (hence excessively costly) to customers who really were in the market mainly for transportation.

Nor is it to be assumed that the 3 to 6 m.p.h. speed for trucks is advocated. A 6 to 8 m.p.h. speed might be a suitable compromise with the result that the gain in speed would be approximately double that of teams under load and yet keeping costs well under the excessive and profit absorbing high costs of the speeds conventionally provided for.

The object of presenting this point of view, which, as to its mechanical deductions is unassailable, is to bring before the motor truck world the idea of reconsidering the element of speed with a view of substantial reductions of costs.

The railways long ago discovered that there was a big difference between the mechanical limits of speed and the commercial limits.

A freight train can be run as fast as the fastest express train, mechanically, but not profitably. The commercial speed limit of a freight train is about one-fifth that of a passenger train.

It appears from a long and careful study of the motor truck situation that the speed fetish has obsessed manufacturers and pur-

chasers alike, that the commercial truck speeds provided for result in costs far in excess of the value of the single element of speed in the general problem of transportation, that in practice these high speeds provided for and paid for, are not realized and that if the motor trucks were built only for practical and reasonable speeds the consequent cost reductions would be astounding and lead to a development of the industry truly parallel to the pleasure car development of the past decade, which has been the great romance of modern business enterprise.

To summarize the foregoing, it appears that if high speed is eliminated from the motor truck problem as a primary selling consideration, and a moderate rate of speed is substituted, that the motor truck purchaser will still have left for consideration as compared to team use:

Greater distance capacity (From 100 to 200 per cent.)

Greater load capacity per unit (100 per cent.)

Greater hauling capacity per day (200 to 400 per cent.)

Greater endurance (100 to 200 per cent.)

Cost reductions (50 to 75 per cent.)

And as compared to higher speed trucks:

In practical use—only slightly less distance realized.

Equal load capacity per unit.

Only slightly less hauling capacity per day realized.

Equal endurance, or greater, as depreciation at lower speeds would be much less.

One-half to three-fourths as great first and operating costs (for same amount of work actually done).

Less danger of accident and collision and altogether a much better and sounder business proposition from the strictly commercial point of view from which the motor truck must be considered.

Transportation, not speed, as a slogan may make the commercial truck the rival to the pleasure car as a business builder.

A SUPPLEMENT TO THE TARIFF SERIES No. 30 Foreign Import Duties on Motor Vehicles and Accessories entitled, Tariff Series No. 30 A Supplement to Foreign Import Duties on Motor Vehicles and Accessories correcting the Original Edition to June, 1917, has just been issued. In general, the supplement reproduces only such tariff items as have been changed, and it should therefore be used in connection with Tariff Series No. 30. Copies of this supplement can now be purchased at 5 cents each from the Superintendent of Documents, Washington, or at the District Offices of the Bureau of Foreign and Domestic Commerce, or the original edition together with the supplement may be secured at 10 cents from the same offices.

Service: A Message to Employees*

By R. E. FULTON

SERVE as defined by "Webster" is to work for; to labor in behalf of; to exert one's self continuously for; to do service for.

The aim of this booklet is to render a service to you by helping you to improve your position and in so doing render the most valuable service to yourself and the company by increasing your efficiency.

Remember always—the value of your service is measured not alone by what you do, but also by the way you do it.

You as an outsider would expect that a great company like ours would select the most capable people for every position and see to it that they performed their duties to the best of their abilities and in a way that would best serve the company's customers.

Are you doing the best you can do? Are you rendering the best service that is in you?

The larger the business, the more perfect should be the service. The public may not expect much from little people or little companies, but it always expects big things of big people and big companies.

The customer of a country "general store" has to be satisfied with the quality and variety of a limited stock and does not complain because the deficient service makes it necessary for him to carry his purchases home. The same person going into a city "department store," however, demands a large and varied stock to select from, and the best of service from the time he enters the store until his purchases are delivered at his home.

A person who buys a truck from the International Motor Co. is justified in expecting a truck of highest quality and the most perfect service that can be rendered. But such trucks cannot be supplied or such service rendered by a single individual; all must contribute.

Service Involves Everyone in Organization

The salesman who solicits the order, the clerk who enters it, the one who transmits it, those who manufacture the trucks, those who test and prepare them for shipment, those who inspect them, the shipping clerks, the truck drivers, the bookkeepers, the bill clerks, are all important factors and each has a responsibility to himself, his associates, our company and the public.

If one is careless, discourteous or inefficient in any respect it may mean extra work for his associates, the customer may be inconvenienced and annoyed, and the company may be put to extra expense as a result of the inefficiency, and in the end may lose a valued customer.

Courtesy is the oil which makes all the company's dealings run along smoothly. Courtesy to one another makes for a pleasant day and good work. Courtesy in dealing with the public is a big factor in shaping public opinion toward the company.

* From a booklet written by the vice-president of the International Motor Co. for distribution among its employees.

Employees should always remember this and treat everyone with courtesy and careful consideration. When an employee is speaking to a person on company matters, he is the company to that person. From him the outsider forms his opinion of the company. The employee may bind him closer, or drive him entirely away. Any employee who lacks the intelligence to realize these important facts cannot possibly obtain much advancement.

Some people fear if they are too polite they will be considered inferiors by others. This is altogether a wrong idea.

No one who amounts to anything is rude. No one can be successful in a big company if he is rude; he cannot possibly attain a high position because he makes enemies of people, both outside and inside of the company, whose approval is necessary to his advancement. Occasionally you find an exception, but as a rule if you are treated with impoliteness by a representative of a company, you may put it down as certain that he does not amount to much in that organization. The important men are always polite.

Courtesy is Inexpensive and Valuable

Courtesy and politeness cost nothing, and if for no other reason should be cultivated as a business asset. Courtesy and politeness are appreciated by everyone and are to business what seasoning is to food—the first thing we miss if lacking.

The customer places an order with our company because he expects to get good trucks at fair prices, and to be served quickly and with courtesy.

An order clerk can take an order in a way which indicates that his day will be happier and pleasanter on account of it; or he may accept it as if it were a condescension and an annoyance.

A driver may deliver a truck in a manner to indicate that the company appreciated the privilege of serving the customer and that he personally was pleased that he had the opportunity.

A service man may dump a lot of parts on the counter in such an indifferent, careless manner, as to cause irritation, even insult, to the customer, and yet give no specific cause for complaint.

It is just as important to be polite in manner as it is in words. You can irritate while listening as well as when speaking. You can imply a respect by concentrated attention to what another person is saying, which will make him feel good all over, or you can irritate him beyond endurance by letting him see that your thoughts are far away.

The customer's drivers or clerks who call for parts may some day be the buyers or own the business; even the messengers who call for quotations or come in to pay a bill or get information, are all prospective buyers, and the impression made upon them by the treatment they receive will go a long way toward determining where their

orders will go when they get into a position to control or influence the business. The man who fails to observe the necessity for courteous attention to all with whom his business brings him in contact, will fail to make the friends whose good-will is a necessary recommendation for his advancement and an assurance of his success.

Moreover, there is the man who is neither a buyer nor a prospective buyer—the man who calls to sell us something. He is entitled to the same courtesy as the customer. He is in our offices on a legitimate errand and should receive our best attention. Remember, we too send out salesmen and we trust they will receive courteous attention. But we cannot consistently ask any better treatment for our representatives than we give to the representatives of other companies.

If a customer can only be impressed with the idea that all through our organization there is a "desire-to-please" spirit, he will surely continue to deal with us. The employee who helps carry out this idea will not only never be out of a job, but will surely win promotion.

It should be our constant aim to please every customer so well that he will recommend the company, and to serve them all so that our position in the business world may be maintained and strengthened.

The fact that every employee can aid in accomplishing this result affords the younger men an opportunity to prove themselves the worthy successors of those who direct the company and have placed it where it now stands.

CAPITOL MOTORS CORP., Fall River, Mass., has been incorporated with a capital stock of \$250,000, to manufacture Capitol trucks. The line will consist of 1, 2, 3½ and 5-ton capacity trucks, designed by Wilhelm Krafve, of Worcester. The Incorporators are: Mr. Krafve, John B. Quinn, John B. Quinn, A. A. Barabe, and Chester T. W. Sutcliffe.

THE AMERICAN AUTOMOBILE ASSOCIATION at its recent meeting in Cleveland went on record as stating that intensive effort in the development of road and highway projects is of the utmost importance to the country at the present time. A resolution was adopted pointing out that there should be no interruption of usual business conditions and that road construction is not only a business itself, but that other industries are aided by good roads. Action was taken urging upon Congress the need for an immediate appropriation to be spent on such work along the north Atlantic coast. The following officers were re-elected: Dr. H. M. Rowe, president; Ralph W. Smith, H. J. Clark, P. J. Walker, David Jameson and Preston Belvin, vice-presidents; John N. Brooks, secretary, and Horace A. Bounell, treasurer. Royal R. Scott and J. E. Garvin were also elected vice-presidents.

SPECIAL COAL-DELIVERY BODY ON ARMLEDER TRUCK

The problem of profitable coal delivery by motor truck to residences and other places where the coal must be carried from truck to a cellar has been solved by a body especially designed for the Armleder trucks, operated by the Schwalb Coal Co., of Rochester, New York. This body has four spouts in the tail gate which can be opened and closed to allow coal to flow out. There is a table attached to the rear of the truck on which four large baskets, each holding 198 lb. of coal, can be placed. When the table is in a lowered position with the baskets upon it, the spouts are opened and the baskets filled. They are closed and the table is elevated by hydraulic hoist to the height of a man's shoulder. The coal is carried to the basement, the baskets replaced and the operation repeated. The baskets are filled and elevated to the height required in six or seven seconds. This enables the company to greatly increase the speed of unloading and cut down the time the truck is standing still. In regular service the company manages to dispose of a five ton load over a 60-foot carry in less than 20 minutes. The bottom of the body is pitched at the rear to 75 degrees so that the coal will run out. Body weight is 2400 lb.

This body makes such exceptional service to customers possible that the Schwalb Coal Co. has found it worth while to prepare an advertising circular describing it and its operation which has been sent to its trade. This is a type of body which brings the truck directly in competition with the horse in its last stronghold in the coal trade. The result for the Schwalb Coal Co. is that 35 head of horses are to be disposed of immediately and replaced by Armleder trucks. Cost figures kept by the company show that by the old horse methods it cost 52 cents to deliver an average ton of coal and with the truck, 32 cents. Two Armleder trucks were put in service by the company about a year ago and have not lost a minute's time since. The average mileage per day is 35. The two-ton trucks are not loaded above their capacity and they yield 9½ miles per gallon of gasoline. The engines run almost constantly from 6:30 in the morning, all day, with the exception of the driver's lunch hour. They run even when the truck is standing still

to unload for the reason that the hydraulic hoist, by which the coal baskets are elevated, is operated by the truck engine. Not the least of the advantages of this new body from the standpoint of the person to whom the coal is delivered is that it is so much cleaner. No coal is spilled and dust is not left on the ground.

ADVERTISING AND THE WAR*

Moral pressure in this war is a vital factor so aviators frequently fly over the contending armies dropping publicity "bullets" to give the real facts to the enemy soldiers.

President Wilson's great war message (perhaps the ablest and finest advertisement of America ever penned) was the latest ammunition used to bombard the enemy lines on the western front.

Those in high position at home who are planning war moves, also recognize advertising as a vital ally in their work.

At the Convention of the Associated Advertising Clubs of the World—the first week in June at St. Louis—J. Murray Allison, of London, told in detail how Britain first refused and then welcomed the all-powerful aid of well directed publicity.

Munitions were short on the western front in the early months. British generals were calling for men and guns. Lloyd George on his appointment as Minister of Munitions at once selected an Advertising Board which, before the office force moved into its quarters, began a campaign to raise a million men who would mold raw materials and explosives into efficient defense machines.

All Britain next day rang with the call for mechanics. They came in thousands from cycle shops, machine shops and factories. Another campaign raised a million women to replace the men in their usual vocations. In six months munitions and volunteers—raised through advertising—were flowing into France and have been ever since.

Here at home advertising is taking its place as one of the great powers which will help win the war for democracy.

In Chicago, early in May, it was desired to secure 150,000 Red Cross members. The committee was headed by an advertising

*An editorial in the July "Firestone," the house organ of the Firestone Tire & Rubber Co.

man. He asked Washington headquarters for \$25,000.00 advertising appropriation and was refused. "Alright," he said, "I will get some patriotic Chicago business houses to furnish the advertising space." He did. He got thirty-five full pages paid for by Chicago business men. They secured in all over 335,000 members, leading the country. The final figures show the cost per member was less in Chicago than any other city in the country where advertising was not used, thus demonstrating beyond any question once again that advertising reduces the cost of distribution, the cost of selling, and should be used more than it is.

The great Liberty Loan was floated largely through the aid of advertising.

When Secretary McAdoo put the sale of the bonds up to the Federal District Banks, the headquarters of the Associated Advertising Clubs wired representative advertising men in each district to co-operate with the District Banks. This they did with the result that the loan has been over-subscribed.

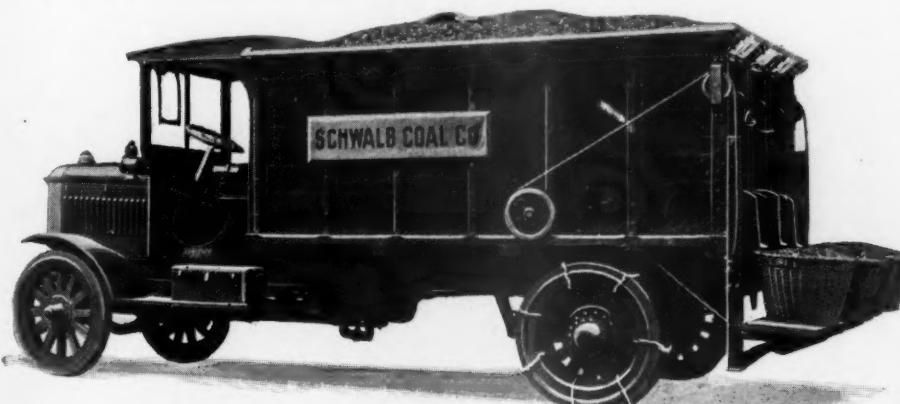
In Detroit, business men contributed over thirty full pages of newspaper space. The same is true in Cleveland, Chicago and many other cities.

Advertising, like America itself, is arousing itself from a bit of a lethargy and when fully in action will contribute immeasurably to the successful outcome of our great struggle.

BOSCH MAGNETO Co., New York City, has decided to concentrate its entire productive facilities on the leading types of its ignition apparatus which are in heavy demand and to postpone for a brief period only the production of the numerous special types called for by special industries. These have been produced in the Springfield, Mass., works, while the Plainfield, N. J., works have been manufacturing the starting and lighting apparatus. The Plainfield works will now be used as an auxiliary to the Springfield works in production of ignition systems.

SELDEN TRUCK SALES Co., Rochester, N. Y., at a recent meeting on June 14th, declared a 5 per cent. dividend on the preferred stock. This is in addition to a 5 per cent. dividend declared six months ago. E. B. Osborn was elected assistant treasurer. Mr. Osborn assumes some of the duties held by Geo. C. Gordon, who since the organization of the company, has been president and treasurer. The sales of trucks for the month of May this year tally 261 per cent. over the corresponding period of last year. Plans are being made for still further additions to the plant.

INGRAM-HATCH MOTOR CORP., Rosebank, N. Y., which will soon announce an air-cooled, 2-cycle, oil engine for stationary, marine, farm tractor and motor truck purposes, recently elected the following officers: Jos. W. Cody, president; Jas. A. Ingram, vice-president; Jas. J. McCullum, treasurer, and John T. Oates, secretary. Walter P. Hatch has resigned as vice-president, and Nelson T. Gutelius was appointed sales and advertising manager. The Ingram 4-cycle air-cooled engine and double friction drive pleasure car are the main features of the line. This engine is also for 1- to 5-ton capacity trucks.



Armleder Truck With Special Coal Body

This is a two-ton chassis, fitted with a novel body for coal delivery. The basket platform is raised after the baskets are filled, the engine supplying the necessary power

MOTOR DELIVERY PROVIDES FOR INCREASED CANDY BUSINESS

Accommodating an increase of more than 30 per cent. in business, and at the same time contributing largely to this increase through the service rendered, is the record established during 1915 and 1916 by a 1½-ton Republic truck used in the wholesale candy business by A. E. Brooks & Co., of Grand Rapids, Mich. The record was

fashion that the truck was considered to be largely responsible for the increase. Frequently city deliveries were wound up by noon and in the afternoon the truck was used to make deliveries to nearby villages in the county.

Early in 1917 a second 1½-ton Republic was purchased by the Brooks Co. and this is now being used for all incoming shipments of freight and for the accommodation of rural trade. Deliveries to Rockford,



Motor Truck Used by Wholesale Candy House

This one and a half ton Republic contributed to and cared for an increase of over thirty per cent in the business of A. E. Brooks & Company, Grand Rapids, Mich.

achieved with but little effort on the part of the truck and at a considerable saving to the company.

Marcus D. Brooks decided on the purchase of a truck in November, 1915. At that time he was contracting for all delivery work, using one single and one double team. The teams were owned outside and were furnished, with one driver included, for \$33 a week. The extra driver cost \$13 a week. The total cost to the company for delivery for a year was \$2392. The contracts were cancelled and the order for the truck was placed. During the first year of operation the expense was \$636. This included insurance, repairs, oils, gasoline, etc., and took into consideration a reckless driver who had four accidents before he was discharged. Added to this was the driver's salary at \$15 a week or \$780, which gave a total truck expense of \$1416, leaving a balance in its favor over the horse-drawn vehicles of \$976. During 1916 expenses of operation were higher, including a raise to \$16 a week for the driver and the total expense of operation was \$1662, lowering the balance in favor of the truck to \$730.

Besides this saving, however, the truck rendered some remarkable service. Because of extensive advertising campaigns and new sales methods the Brooks Co. effected an increase in business in 1915 of 26 per cent. and nearly 35 per cent. in 1916. To this increase the truck responded undauntedly and on only a few widely-separated occasions was it necessary to call in assistance from a truckage concern, and then only to handle incoming freight. One-day deliveries to all the little retail stores in Grand Rapids were made possible and the trade was cared for in such a brisk

Kent City, Sparta, and other towns within a radius of 20 miles are included. The salesmen of the company, in covering these small towns, telephone their orders to the factory. Often these orders are filled at once and the merchant, although 20 miles from the city, will receive the goods in the afternoon. At no time is the order more than one day old before it is filled. With this plan in operation all merchants know of Brooks' service and the knowledge of this service, made possible by the Republic trucks, is the one big item responsible for the big increase in the firm's business.

It is expected that the Brooks Co. will purchase another truck in the fall—a heavy duty vehicle—which will be used during the winter months when poor traffic conditions make deliveries a matter of conjecture.

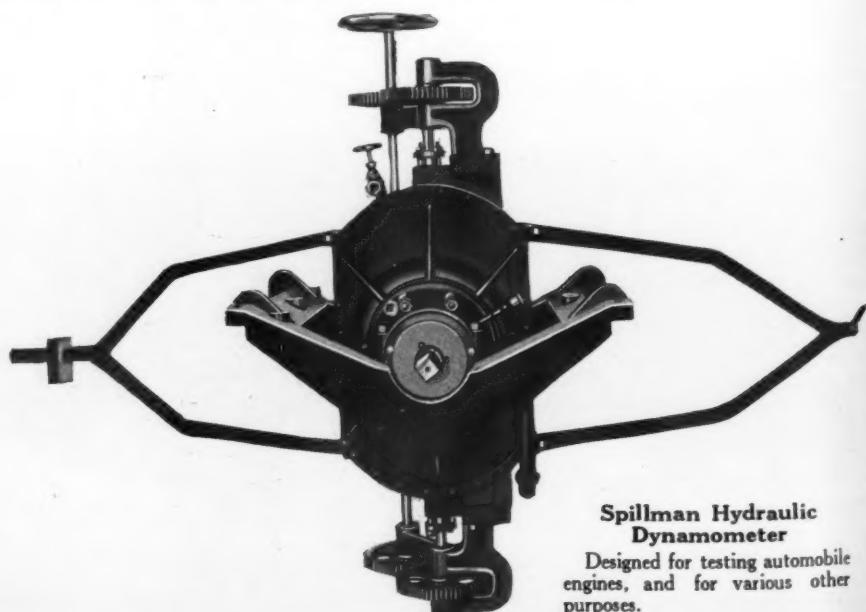
THE SPILLMAN HYDRAULIC DYNAMOMETER

To satisfy the demand for a satisfactory dynamometer, suitable for testing automobile engines, the Spillman water brake has been developed. This instrument consists of a double rotating turbine with two stationary and two revolving members. Water enters the brake through holes in the stationary turbine blades, and the passage of water from the stationary to the revolving parts and back again is controlled by opening and closing sluices through the hand wheel shown in the illustration. When the passages are wide open the load is at its maximum. The arrangement of the gearing maintains the brake in a state of equilibrium by moving both sets of gears equally. A sufficient amount of water must pass through the brake to absorb the heat generated.

The apparatus is mounted upon roller bearings so that friction is negligible. One of the extending arms can be attached to a spring balance or other means of measuring the torque and on the other arm a counterbalancing weight is placed and the instrument is used like an electric dynamometer.

It is possible to use this device for a variety of purposes other than for engine testing. The water brake can be used by manufacturers of carburetors, magnetos, battery ignition systems, etc., in ascertaining the relative efficiency of other devices at different engine speeds and under various conditions.

The Spillman hydraulic dynamometer is suitable for testing engines up to $5\frac{3}{4} \times 6$ in. 6-cylinder. This size has a 14-in. rotor and measures 8 ft. 2 in. across the arms. The length of the shaft is $2\frac{1}{2}$ in. and the weight is 350 lb. The dynamometer is made by the Herschell-Spillman Co., North Tonawanda, N. Y., and sells for \$250 net, f.o.b. factory.



Spillman Hydraulic Dynamometer

Designed for testing automobile engines, and for various other purposes.

STREET RAILWAY "TROUBLE" CREW TRUCKS

In public utility service the motor truck is almost as indispensable as the equipment used on the lines, according to Benjamin S. Hanchett, president of the street railway company at Grand Rapids, Mich. Since the adoption of trucks by this company more than eight years ago the vehicles have proved so very valuable that it is now considered that suitable service for the public could not be maintained without them.

Formerly four horse-drawn wagons, equipped with supplies and men, responded to the various trouble calls. If the trouble happened to be in a remote part of the city one of these trucks would make one trip, and not over three, a day. Naturally, also, service on the damaged lines was tied up for a much longer time, as a result of this slow response. Now the big service trucks, operating from a central base, can respond to a call from the most remote point in the city in 30 minutes.

The three trucks of the company very capably handle every bit of trouble that arises—and it has increased over 50 per cent. since the days of the horse-drawn rigs. As many as 10 calls a day with each truck have been made, frequently one truck making a trip from the end of one car line to another as a part of its duty. Besides this work the trucks do all the short hauling of freight to and from the various depots.

Even with the increased trouble service rendered the expense of operation, as compared to the horse-drawn vehicles, is lower. With the horses four drivers were required and a large barn was maintained with two men in charge. Now three drivers are used and the barn has been converted into a garage. The drivers care for their own vehicles and consequently the services of the keepers are dispensed with. The actual cost for gasoline, oils and tires, although considerable because of the exceptional strain the trucks labor under, is only about 85 per cent. as large as the former cost of feeding, etc.

The Grand Rapids Railway Co. operates a 3-ton White truck, a 2-ton Decatur and

a 1½-ton Grabowsky. The White has been in service for four years, replacing a White which had been used for more than four years. The Decatur and Grabowsky have both seen three years of service. Two of the trucks were equipped with aerial platforms from which overhead repairs are made. Incidentally, because of the stability of the trucks as foundations for the platforms, not one accident has been recorded since their use, while with the horse-drawn rig, as many as 15 accidents to workmen, caused by the unsteady mounting, were recorded.

PROPOSED CO-OPERATIVE DE-LIVERY SERVICE FOR GRAND RAPIDS

The advisability of maintaining a co-operative delivery system among the merchants of Grand Rapids, Mich., whose individual trade does not warrant the maintenance of a privately-owned truck, is being championed by Ernest P. Carr, of the Carr-Hutchins-Angerson Co., a leading haberdashery firm. The idea, although fostered by Mr. Carr for several years, was focalized when the subject was introduced through the interest of the COMMERCIAL CAR JOURNAL.

At present the Carr-Hutchins-Angerson Co., like hundreds of other merchants, employs the best delivery services obtainable which, for the most part, fall short of requirements. Several motorcyclists, making the delivery a business, hold contracts with these companies. They arrange to make at least four trips a day and the cost to the merchants is nearly 10 cents a package. From the cost standpoint alone this system of delivery is far out of proportion. The expense during the year runs into big figures. It would not be so bad if all deliveries were legitimate, but in many cases they are not. Women shoppers, out for an afternoon, have many parcels "sent up for approval." The parcels are then rejected and the company pays for the return. This happens a countless number of times during a year and there is no remedy for it. It must be done and when each "phony" order costs 20 cents in the delivering it is no mean item.

Besides this objection of high cost the cyclists cannot be depended upon. Most of them have so many delivery accounts that they frequently overlook important issues. Any number of parcels are left, late of an afternoon, which are important and frequently this failure to deliver means the loss of the customer.

Some merchants in Grand Rapids utilize the city messenger service for delivery. This costs 10 cents one way, within a radius of 1 mile of the business section and 15 cents outside that area. And with this there is always the delay occasioned by slow response to say nothing of the time lost in calling. Irresponsible boys usually operate from the service and they too frequently make mistakes. One firm, through this method of delivery, lost 15 parcels in 1916 through carelessness. The value of those parcels aggregated \$30. The goods required to replace them was worth \$30. And to this was added the chagrin of the patrons, the time lost in the original selling and replacing, and the stigma on the reputation of the store.

Boys with wheels are used in some places, reporting regularly each day. This service is really quite satisfactory as well as economical, but it is difficult to maintain for the reason that boys are getting scarce. The present war conditions have put many jobs on the market and the youths are filling them. It will not be so very long before the wages of the "boy" will be exceptionally large and not one will be satisfied to pedal a wheel in delivering for a price less than he could earn elsewhere. And with low price essential to the success of the system the merchant will find himself up against a problem. It will be a case of spending more money and if he does this he might far better be in a co-operative delivery association.

Merchants Favorably Disposed Toward Plan

These are only a few of the arguments that are being advanced by Mr. Carr. He is enthusiastically turning his attention to the idea and he is meeting with favorable support from all sides. His thought is to purchase a truck, possibly of the 2-ton variety, and then weed out a number of applicants to secure a competent and efficient driver. A schedule of deliveries will then be made and pickups will be made at each store. The expense of the original cost of the car will be met at the outset and thereafter every expense of operation and maintenance will be set down, the driver of the machine reporting daily to some one merchant who will be delegated to keep the books and will be given his deliveries a trifle cheaper for this trouble. The total expense will then be pro rated at the end of a month. The rating will be figured on the basis of so much a parcel. This expense will vary, but the man who has 100 bundles delivered will be paying on the same scale as the man who offers only 6. The big idea will be to secure firms and dealers whose trades will entail about the same amount of delivery. In this way the best results will be achieved.

Mr. Carr has started to achieve this object in earnest and he expects to be the purchaser of a truck, for the co-operative service, before the summer is over.



Three Trucks Operated by the Street Railway Company at Grand Rapids, Michigan, for Troubles on the Lines

"Service" the Keynote of Autocar Company's Success

Steady Growth of Autocar Company's Plant Due to Well-Defined Business Principles Established at the Very Beginning

TODAY more than 4200 business houses in over 250 different lines of activity are using the Autocar motor truck, built by the Autocar Co., at Ardmore, Pa. The Autocar Co. is one of the big representative motor truck companies of the country—the factory is just at the door of Philadelphia and the sound merit of the Autocar itself, the aggressive sales and advertising policy that is behind it is helping mightily to make the Quaker City in fact "the world's greatest workshop."

The present company is the outgrowth of a small company called "The Pittsburgh Motor Vehicle Co." organized in Pittsburgh in 1897. In 1899 the original company was taken over by "The Autocar Co." The founders of both of these organizations were the Messrs. Louis S. Clarke and John S. Clarke, who are today the principal stockholders of the Autocar Co.

In 1900 the plant of the Autocar Co. was moved to Ardmore and the company has always taken a leading position in the development of the automobile industry. In 1908 the first Autocar motor truck was put on the market and the demand for commercial vehicles grew so rapidly that in 1911 the production of pleasure cars was entirely given up.

Factory at Ardmore

The Autocar plant is in the center of the town of Ardmore, eight miles from Philadelphia on the Main Line of the Pennsylvania Railroad. The main factory buildings are on Lancaster avenue, the main highway from Philadelphia to the west.

The buildings are mostly of brick and cover several acres of ground. In every detail the buildings and equipment are the latest. During the past two years there have been three factory additions to the Autocar plant, necessitated by the tremendous demand for this delivery truck for the service of domestic business houses.

The latest factory addition is a tremendous brick building used entirely for the painting, finishing and shipping of Autocars. This plant handles the Autocar after its road test until it is shipped. It is an inspiring sight to see the long rows of chassis in this building and to realize that they are going out to every part of the land to lessen the cost of distributing goods, and to render to the American public a delivery service that has become an absolute necessity.

The Autocar truck is manufactured right from the raw material in the Autocar factory—different parts of the machine shops work on the different assembly units which are then passed on to the main assembling plant. It has always been the policy of the Autocar Co. to develop the simplest mechanism possible and a trip through the assembling floors shows what a marked advantage this simplicity of construction gives in handling Autocar repair work. The

different units of an Autocar are all readily accessible and can be removed or repaired as units.

"Service" has been the keynote of the Autocar Co.'s selling policy from the very beginning and, as the demand for Autocars increased and the output grew, a service foundation has been built for Autocar users in the big centers of the country.

Factory branches for the sale of Autocars are now established in Philadelphia, New York, Boston, Chicago, Baltimore, Providence, Newark, Pittsburgh, Washington, San Francisco and Los Angeles.

In every case the company has shown the foresight to build plants to care for future demand; for beyond a shadow of

reflect in the National Capital the absolutely thorough service policy of the parent company.

"Used in every line of business" has been a slogan of the Autocar Co., and the list of thousands of Autocar users from coast to coast bears it out. It is an interesting study of the development of motor transportation to look into the varied uses of this one motor truck.

Hundreds of coal dealers are listed among the users of the Autocar; in fact, more than one hundred and fifty members of the Pennsylvania Retail Coal Merchants' Association are delivering with them.

The express companies, of course, have always been big buyers of Autocars, and



Airplane View of the Autocar Company's Plant at Ardmore, Pa.

doubt the motor truck industry is destined to be one of the very greatest industries in the country.

In each city where an Autocar factory branch is established an organization is built up, and, as the service demand grows, facilities are added to cover the situation years ahead.

Branch Plant in Baltimore

The latest addition to the branch plant of the Autocar Co. is the splendid new brick building in Baltimore. This is one of the most complete motor truck service stations in the country and is in keeping with the other splendid branch plants of the company.

New service plants are now under way in Pittsburgh and Washington, the local organizations are being built up and a rapidly increasing number of Autocars are being sold in those cities. The Washington plant will be on Pennsylvania Avenue and no detail has been spared to make it

the Adams Express Co.'s fleet of more than 425 Autocars is the biggest fleet of trucks of one make in the service of any one concern in the country. In all, well over six hundred express companies, large and small, are Autocar users.

John Wanamaker, Gimbel Brothers, Lit Brothers, N. Snellenburg—in fact, a large proportion of the department stores are reaching out into the suburbs farther and farther, and depending on the Autocar to do it.

Contractors have been active buyers of Autocars and the Autocar Co. has developed a special steel contractor's body which dumps automatically by means of the car motor. There has been an ever growing demand in this kind of work for a truck that is light enough and compact enough to handle easily in congested spaces.

A type of business that is using more and more Autocars all the time is the large manufacturing plants. In this kind of work Autocars are used very generally for haul-

ing in and around the plant. Fleets of Autocars are in the service of such well-known concerns as Baldwin Locomotive Works, E. W. Bliss Co., Yale & Towne Mfg. Co., and many others.

An especially interesting Autocar installation along these lines is that of the Schoellkopf Aniline & Chemical Co., of Buffalo. This plant covers acres and acres of ground and they have found that the Autocar, with its short wheelbase and small turning radius, can do the plant work with greatest facility.

A feature of the Autocar business is the very large proportion of repeat orders that are received from the thousands of Autocar users. This business is, without question, a tribute to the quality of the Autocar, and moreover a tribute to the unusually efficient service system that never loses interest in an Autocar from the day it goes into service.

The Autocar Organization

Men of wide experience in the motor truck business head the Autocar Co. The officers are: President, David S. Ludlum; vice presidents, Louis S. Clarke, John S. Clarke, Edwin A. Fitts, Walter W. Norton; secretary and treasurer, Frank C. Lewin, and assistant secretary and treasurer, John C. Taney.

The financial statement of December 30 last reflects the sound and prosperous condition of the company. The assets were \$5,344,532 and liabilities \$2,375,919. Surplus and reserve amounted to \$948,613. The Autocar Co. is capitalized at \$2,000,000 all paid in, and during 1916 cash dividends, amounting to \$225,000, were paid.

THE WEST SIDE Y. M. C. A. AUTOMOBILE SCHOOL, New York City, is experimenting with a new automobile fuel known as Nuoline, which will sell at 10 cents a gallon. Louis Clement, a Danish chemist and the inventor, claims that the ingredients are cheap, two-thirds being water. A road test of 415 miles was recently made and the average was 11 miles per gallon. A company is being organized to manufacture Nuoline commercially. The president will be Senator Robert Lawson, of Brooklyn. Associated with him will be H. C. Brokaw, M. Clemont, Dr. H. O. Lehman and H. Boes.

THE GUARANTY TRUCK-FORMING UNIT AND THOSE BEHIND IT

One of the later entrants into the field of Ford truck attachment building is the Guaranty Motors Co., Cambridge, Mass. Eventually this company is also going into the business of manufacturing a complete truck. At present two forms of attachment are built for application to the Ford chassis, both equipped with internal gear drive and one arranged with a power hoist dumping body. The attachments are also made applicable to other makes of automobile. In a later issue description of the units themselves will be given. It is the present purpose to give a brief account of two of the men who are identified with the organization.

Samuel W. Prussian, the president, came to this country at the age of eleven years and was first employed as buffer boy in a retail furniture establishment. His interest in the work and suggestions he made for improvements consequent upon his



SAMUEL W. PRUSSIAN

being of an observing disposition brought him rapid advancement until he became owner and proprietor of one retail furniture establishment after another. Going to Cambridge in 1914 he purchased the C. B. Muller, Inc., furniture business, and it was in connection with the delivery service pertaining thereto that he first became interested in motor trucking. It was

thus that his attention was drawn to the converting of Fords and other passenger cars to commercial purposes and, with the aid of expert automobile engineers, he developed the Guaranty unit attachment. Convincing of its commercial importance he immediately took steps to manufacture and market the outfit and in the early fall of 1916 it was formally introduced.

Actively supporting Mr. Prussian in this enterprise is Allen A. Macool, formerly identified with the Hudford truck unit as



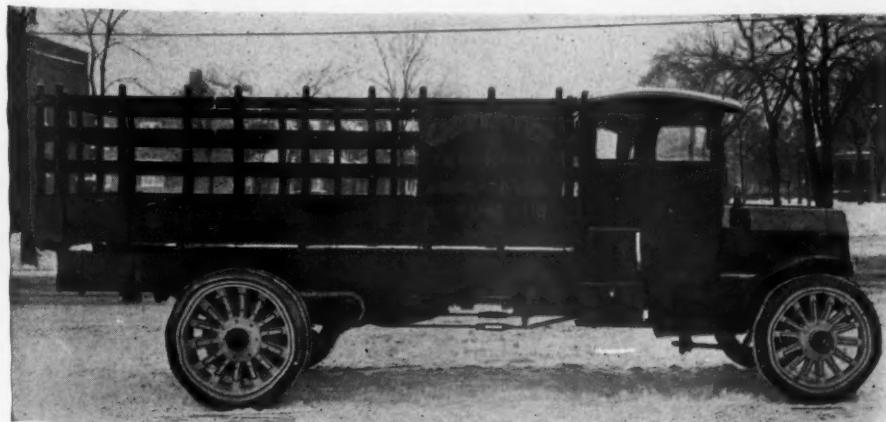
ALLEN A. MACOOL

assistant sales manager of the Hudford Co. and later with the Commercial Car Unit Co., when the name was changed with the coming in of the new management. Mr. Macool is now sales manager of the Guaranty Motors Co.

Mr. Macool is keenly enthusiastic over the present and future possibilities of the commercial car field and predicts that in a few years there will be more trucks than pleasure cars in service. He is a staunch advocate of the value to the manufacturers of making the dealer and the consumer acquainted with their products by aggressive advertising.

THE N. A. C. C. HAS TAKEN OVER a technical school of body designing in New York City in order that technical training may be placed within the reach of factory employees. The employees of any manufacturer of cars or bodies are eligible for admission. There are two classes of instruction—class, which is free, and correspondence, which costs \$24 for three terms, made up of \$6, \$8 and \$10 respectively. The name of the school is the Technical School for Automobile Draftsmen and Mechanics, and is located at 20 W. 44th Street.

THE AMERICAN AUTOMOBILE ASSOCIATION, with the encouragement of the War Department, is working out a plan for the voluntary enlistment of automobile and motor truck owners for short periods, the understanding being that their services are offered for emergencies. The War Department does not anticipate the necessity of commandeering private cars for war use, as the supply of both automobiles and trucks is more than adequate at the present time.



A Fruehauf Truck Body Attached to a Peerless Truck

These bodies are attached to the frame as desired and are constructed of ash and hickory throughout. The Fruehauf Trailer Company, Detroit, Mich., manufacture these bodies.

ECONOMIES EFFECTED BY ELECTRIC REFUSE-TRUCKS

The results achieved in Dover, England, by the introduction of electric trucks for refuse collection should be of interest to municipal authorities of this country. The London "Electric Vehicle" prints the report recently presented by the deputy borough engineer giving the operating costs of the Dover "electrics" during fifteen months' use.

"Five $\frac{1}{2}$ ton vans are employed, and these, in the fifteen months, have dealt with 12,741 tons of house refuse, at the rate of 849 tons per month. In addition, the vehicles have done other work for which revenue was directly earned, such as conveying ashes from the docks and general carting for other departments. The comparatively small amount of such revenue-earning work done was due to the increased amount of house refuse that had to be dealt with—an average of 45 tons extra per week over the amounts in the previous year. In the days of horse haulage this would have necessitated the employment of five additional horses and carts at an extra cost of £910 per year—an expense which the use of the 'electrics' have saved.

"It should be noted that not all the vehicles have been in use the full fifteen months, the last delivered having been at work only seven months.

"The expenses connected with operating the five electric vans for the fifteen months are as detailed:

Table of Operative Costs of Dover Electric Vehicles

	Totals
	£ s. d.
Actual wages paid	1177 0 8
Proportion of foreman's wages..	37 6 9
Wages of man at tip	48 15 0
Rents of two tips	60 8 4
Repairs and maintenance	116 5 2
Stores and sundries	12 15 4
Tires	67 5 2
*Capital charges of vehicles	606 10 0
Electrical energy at 1.5d. per unit	279 4 9
Insurance	36 0 0
Total	£ 2441 11 2

"Thus the total cost per ton of refuse collected was 3s. 9.98d., which contrasts strikingly with the previous cost of collection by horses and carts—6s. 2d. per ton. The total cost per mile, excluding wages and capital charges, was 4.254d."

An unique method of collecting garbage exists at Miami, Florida, where two 2-ton electric trucks with double-deck bodies carrying about 80 filled cans and 40 empties are employed. Each family must provide itself with at least two of the standard sized cans, and, by city regulation, the top of each can must be first covered with a piece of newspaper before placing the metal cover on the can. Then the owner is permitted to place the can on the street curb, and when the truck arrives the filled can is taken up and an empty one left in its place. No emptying of garbage cans

* Capital charges reckoned upon five vehicles in use from seven to fifteen months.

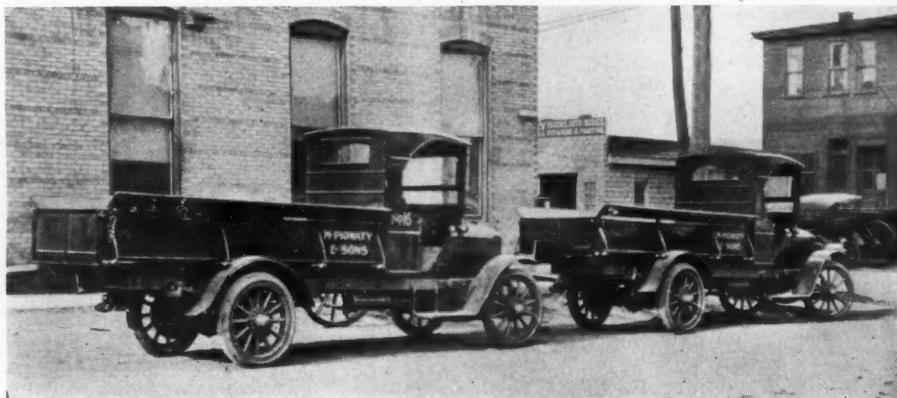
is permitted in the streets, thus the trucks are kept clean as well as the streets and sidewalks, and all obnoxious odors are eliminated. No cost figures are available but the owners of these novel garbage trucks claim that they have proven to be time and money savers over the horse-drawn vehicles previously employed.

handling it. Since it makes a joint that is stronger than the original metal, it is, if anything, superior to welding and there being so much less equipment necessary, there would seem to be little excuse for even the smallest repair shops not being equipped for handling repairs of this character. The steadily increasing use of aluminum for automobile parts means an ever-increasing demand for the material.

The price of the solder is \$3 per pound, but as this is enough to do over \$50 worth of repair work, its cost is a small consideration.

FRUIT DEALER HAS FLEET OF SEVENTEEN

A little more than three years ago M. Piowaty & Sons, fruit dealers and distributors in Grand Rapids and western Michigan, purchased a motor truck for the purpose of giving it a trial. For two months



Nos. 16 and 17 in Western Michigan Fruit Dealer's Fleet

These two GMC trucks make the total number purchased by M. Piowaty & Sons, in three years, seventeen

mental and not where the soldier had joined the two pieces, and this is universally the result. The solder is actually stronger than the original aluminum metal.

All of this would not be of much interest if the material was difficult to handle, but the soldering of aluminum with this composition or alloy is no more difficult than the joining together of pieces of tin with ordinary solder.

In place of the soldering iron a file is used or other abrasive instrument for clearing the surface of the aluminum from oxide while the heat of the torch is being played upon it and in this way a small amount of the solder is worked over the surface until the edges to be joined are "tinned." The break is usually prepared as for welding, the edges being scarfed or chamfered, and after they have been "tinned," the metal is melted in drop by drop as in welding with the oxy-acetylene torch. After a short time for gradual cooling (it is harmful to the joint to quench it) the material can be subjected to such severe tests as already outlined.

The solder has a comparatively low melting point, about 300 degrees, so that it is easily melted by a gas or gasoline torch. No flux is used, or at least none outside of that which is included in the composition of the alloy and almost no skill is necessary in

a record was kept and compared with a record of the horse-drawn equipment. The results were convincing. Recently the company purchased two more trucks of the G. M. C. line and these are No. 16 and 17 in the fleet now in operation. On an original complement of 30 horses owned by the company only four remain and they are used only in short-haul work in the city. The various units of the fleet operate entirely through western Michigan and during the past six months have been the means of saving the company's life. But for them operations in many communities would have come to a standstill because of the freight car shortage.

The Piowaty company uses a system of rewards for drivers for careful work. It is computed on the basis of mileage, expense for gas and oil and repairs. This system has made the fleet unusually efficient.

THE DENNEEN MOTOR CO., Cleveland, O., has recently sent out prices announcements as follows: $\frac{3}{4}$ -ton Model 12, three different types of bodies, \$995, \$1020 \$1065; $1\frac{1}{4}$ -ton Model 10, chassis only, \$1490; 2-ton Model 15, chassis only, \$1790; 3-ton Model 14, \$2325.

Suburban Motor 'Bus Lines

By R. E. DOWNER

TWO motor bus lines are operated between Buffalo and points east by a company of which W. H. Pensseyres, of Buffalo, is the head. The first line to be started was the Buffalo & Akron, 18 miles long. Mr. Pensseyres afterward put in operation the Buffalo & Alden, 21 miles long.

Two 'buses are used on the Buffalo & Akron line, and one on the Buffalo & Alden. Special trips are also made in the summer to Angola, headquarters for sum-

The motor bus in the picture is one operated on the Buffalo & Akron line. The 'buses are assembled by the company, and while not exactly alike bear a close resemblance to each other. The one shown has a Buick 4-cylinder 40-hp. motor, and the rear axle has Newell cushion wheels. Fore doors only are provided. A double row of double seats facing forward provides accommodation for 26 passengers.

The 'bus makes its trips on a regular schedule, 1½ hours being required each

The Buffalo terminal of the Akron line is at the Buffalo Savings bank and of the Alden line at the Lafayette hotel. Both Akron and Alden are on steam railroad lines, but the bus lines serve points between which have no railroad service.

A motor 'bus line has been started this spring operating between Hamburg and Springville, the former 11 miles from Buffalo on two electric lines and a steam road, the other 35 miles from Buffalo on the Buffalo, Rochester & Pittsburgh. Since the recent suspension of the Buffalo & Susquehanna railroad, there has been no direct means of communication between these two points, and persons wishing to go from one place to the other came to Buffalo on one railroad and went out on another, traveling two sides of a triangle instead of proceeding on a more or less direct line.

TIME TABLE LEAVING AKRON

	A. M.	P. M.
Akron	7.15	2.00
Grant Club ..	7.20	2.05
Clarence ..	7.35	2.20
Gunnville ..	7.45	2.30
Shimererville ..	7.50	2.35
Transit Road ..	8.00	2.45
Williamsville ..	8.10	2.55
City Line ..	8.20	3.05
Main & Genesee ..	8.45	3.30

FARE

Akron to Buffalo	50
Clarence to Buffalo	40
Transit Road to Buffalo	25
Between All Time Points	10

TIME TABLE LEAVING BUFFALO

	A. M.	P. M.
Main & Genesee	10.00	5.30
City Line	10.25	5.55
Williamsville	10.35	6.05
Transit Road	10.45	6.15
Shimererville	10.55	6.25
Gunnville	11.00	6.30
Clarence	11.10	6.40
Grant Club	11.25	6.55
Akron	11.30	7.00

Cars will leave at Buffalo Savings Bank, Main and Genesee Streets, and Berghorn and Otting's Drug Store at Akron.

Time Table of the Buffalo and Akron 'Bus Line

mer camps of Buffalo churches, the Fresh Air Mission, and the Y. M. C. A.

Buses owned by this company also take to and from a local fresh air school the children who attend this institution, two busses gathering up loads at the various homes in the morning and delivering at the close of school. One 'bus does the work at noon.

way. In the city the bus makes about the same time as the street cars, but carries no local passengers in the city, the International (electric) Railway, paralleling it to the city line, and the Buffalo & Williamsville (electric) between the city line and the village.

The time table of the Buffalo & Akron line follows:



Motor 'Bus Operating Between Buffalo, N.Y., and Akron, Ohio
Converted From an Old Four-Cylinder Buick

Opportunity comes to the well-informed. Read the CCJ

A GOOD TRUCK SALESMAN'S CREED

By LEIGH LYNCH*

This is my idea of salesmanship—perhaps original with myself, but if adhered to and made a standard practice would place the truck salesman in a much more dignified and enviable position:

I believe in honesty—honesty in purpose, honesty in product and honesty in keeping that product honest. I believe in personality—the ability to put the best part of one's personality into each truck yourself—building a vehicle that not only stays sold, but sells another, building a truck that is pleasing in appearance, honest in performance, low in upkeep and with a large margin of safety in its construction. I believe in advertising—sane conservative advertising—that tells the truth about your product and the way you want to sell it—to build up a selling organization based on the ideals above mentioned. If all this is done, you can look for a result that will make you not only satisfied with yourself, but satisfied with your job and when you have done that, you are a success.

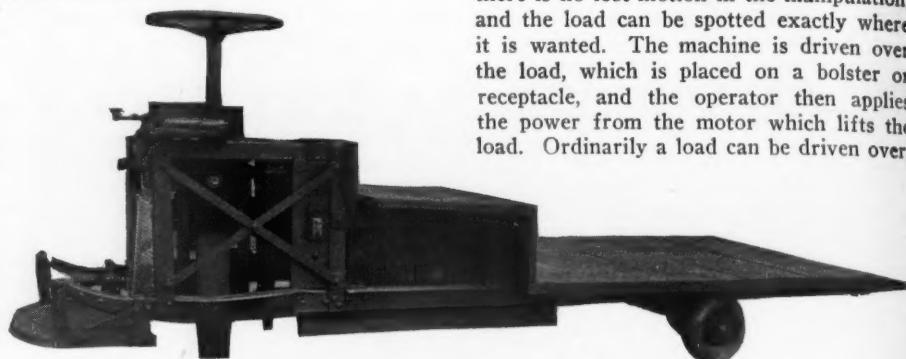
* Secretary and Sales Manager, Columbia Motor Truck and Trailer Co.

ELECTRIC FLOOR TRUCKS AND TRACTORS

The special features of the Enterprise electric industrial floor trucks, offered by the Enterprise Machine Works, Los Angeles, Cal., are ability to turn within the wheelbase length, simple make-up, low first cost, low up-keep, speed control system without resistance and lightness. The trucks are made with a loading platform 12 in. high from the floor; however, any height can be readily supplied to suit demands.

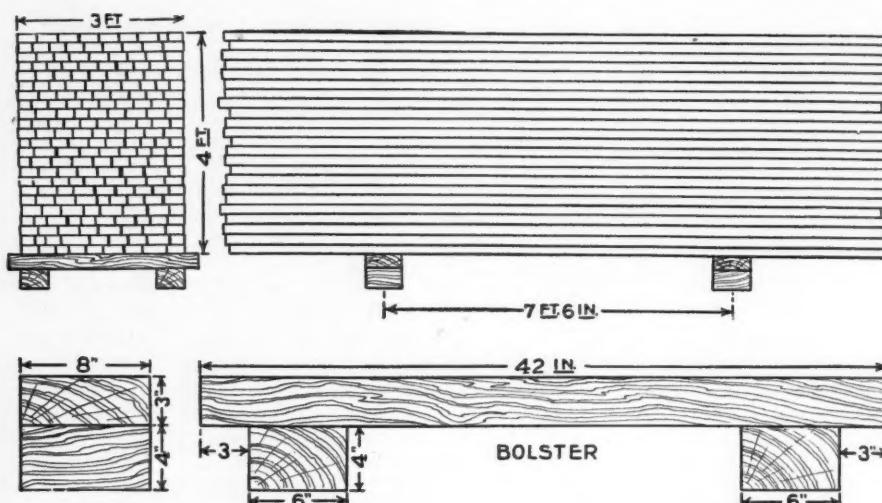
A special high-speed, four-pole motor running on Hess-Bright ball bearings is the power plant and it is mounted on the yoke over the traction wheel and geared thereto for propulsion and steering of the truck. Speed control is by the Haschke non-resistance system in which the battery is always in series, the three speeds being obtained by cutting out field coils harmoniously on each pole piece. It is a speed controller consisting of a single switch-blade engaging into three switch jaws. The con-

cular track, to withstand rough road-bed operating. The loading space dimensions are: width, 3 ft., 9 in.; length, 7 ft., 2 in., but these can be changed at the option of the purchaser. The weight of the truck is 1500 lbs. and the mileage radius operation is about 25 to 40 miles, according to the loads and road-bed.



The Enterprise Industrial Floor-Truck and Tractor

Has a turning radius within the length of the truck and the battery may be recharged with a direct current of ten to twenty-five amperes and fifty volts.



Type of Bolster Used in Hauling Lumber With the Ross Truck

trol of the motor can also be operated by the foot brake automatically.

As standard equipment a 14-cell, 15-plate storage battery is used, either Gould, Exide or Philadelphia make; the battery is supported low under the truck and suspended on coil springs.

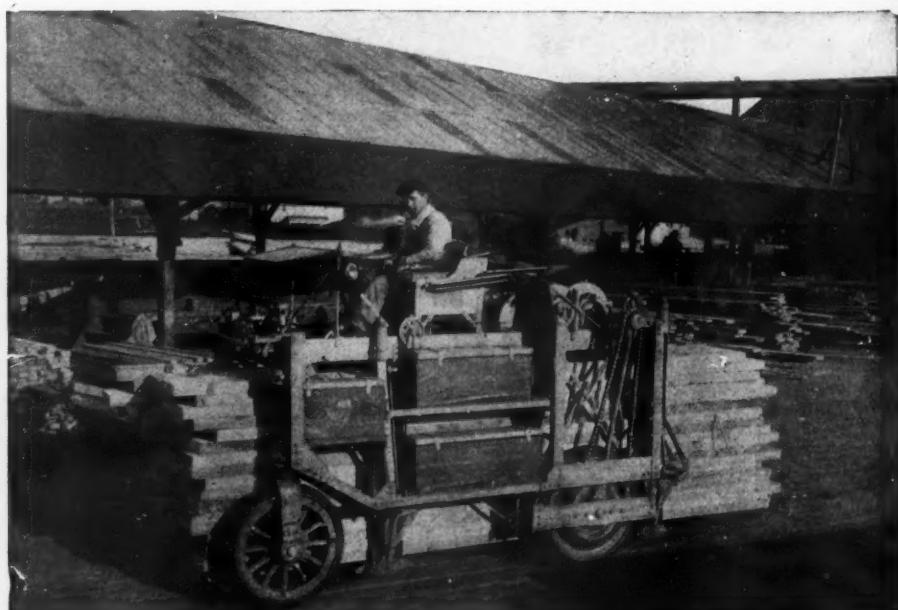
The traction wheel is cast steel, while the rear are the same unless used for a lumber tractor, when wooden-spoked wheels are used with iron tires. The traction wheel is equipped with a 16 x 4½-in. rubber tire and the rear wheels with 10 x 3½-in. rubber tires, Goodrich pressed-on type. The brakes are foot operated, with electric current cut-off, affecting 2-in. contracting brake bands on each rear wheel. The wheelbase of the standard floor truck is 66 in. and for the tractor, 40 in., while the tread is 37 in.

Steering is accomplished by mounting direct to the steering head a large size automobile steering wheel. The steering head revolves in a Timken roller bearing and has two projecting arms terminating with small ball-bearing wheels running on a cir-

THE ROSS ELECTRIC TRUCK

The Covell Mfg Co., of Benton Harbor, Mich., is putting out a new type of electric truck designed to handle lumber at saw mills and lumber yards. It may also be used by large industrial plants for different classes of hauling. The makers state that there is no lost motion in the manipulation, and the load can be spotted exactly where it is wanted. The machine is driven over the load, which is placed on a bolster or receptacle, and the operator then applies the power from the motor which lifts the load. Ordinarily a load can be driven over,

picked up and started away in 15 seconds. Another desirable feature is that the Ross machine will move either backward or forward with equal ease, and it can also be turned on a very short radius. One truck is capable of carrying 3000 ft. of lumber or from 5 to 10 tons of other commodities at a load. Its flexibility permits handling of ties 8 ft. long or timbers 100 ft. in length. The machine is operated by 44 cell storage batteries and can be charged by electric power developed from waste. It is so arranged that it can be used 24 hours a day in case of emergency. Equipment includes solid Goodrich rubber tires and a substantial carrier, consisting of a riveted frame work of steel throughout and equipped with a top so that the work goes on uninterrupted in rainy weather. It has 6 h.p. rating, although three times this power can be developed.



Ross Electric Truck at Work in a Northwest Lumber Plant

THE ELECTRIC TRAIL-OR TRUCK

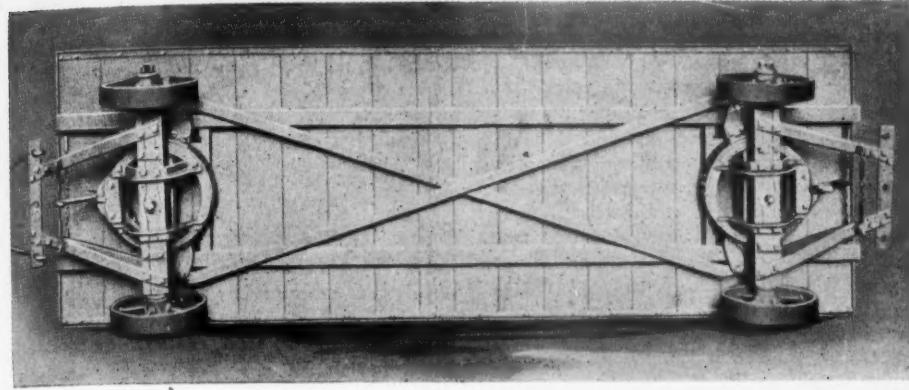
A heavy duty cross reach trailer that can be instantly changed into a cut-under fifth wheel truck for ready shifting by hand has been brought out by the Electric Wheel Co., Quincy, Ill. The Trail-Or truck as it is called, has been brought out to meet the demand from many sources for a heavy duty large platform trailer of such design that it can be detached from the train and

on cushion tire or fibre tire wheels quoted on application.

Nominal capacity is $2\frac{1}{2}$ tons. The weight is approximately 1200 lb.

As a cross reach truck it turns in approximately 8 ft. 6 in., and as a fifth wheel truck it turns in its own length.

With steel wheels, 12 to 24 trailers, each, the price is \$105; 6 to 12 trailers, each, \$110 f.o.b. Quincy, Ill.



An Industrial Trailer With the Cut-Under Fifth Wheel Feature

This trailer has a 144 x 48 in. platform and 104 in. wheelbase. Wheels are of steel, 18 in. diameter, and hubs are equipped with caged roller bearings and compression grease cups

readily shifted into any position by hand, or as occasion requires, may be used as a single unit by man power. It is claimed to successfully and completely answer both requirements, and can be changed from either use to the other without the aid of tools. The advantage of the cross reach lies in the perfect tracking of each trailer with the tractor regardless of the number of turns it is making and, upon the throwing of a lever operated from either end of the truck, the cross reaches are locked and the fifth wheel nearest the operator is left free, giving a cut-under fifth wheel truck for hand use, turning in its own length.

The construction is of steel throughout except the platform and the wood cushions on the axles. These cushions provide a 4-in. thickness of wood on which the fifth wheels are mounted, reducing the vibration and adding to the life of the truck. The platform is oak. The large fifth wheel is of such construction that tipping of the platform is practically impossible. Edges of the platform are fully protected with angle steel on top and edge. A combination tongue for either trailer or hand use may be used at either end of the truck and lifts from the socket by raising to an upright position.

Specifications

Platform width, 4 ft.; length, 12 ft.

Height of top of platform, 25 in.

Wheelbase, 8 2-3 ft.

Width of track, center to center of tires, 3 ft.

Axles, 1 $\frac{3}{4}$ in.

All rivets are driven hot, all bolted constructions with lock washers or castellated nuts.

Wheels—Unbreakable steel wheels, 18 in. diameter; tires, 3 in. wide, hubs equipped with caged roller bearings and compression grease cups.

Pressed on type rubber tires can be furnished on regular steel wheels. Prices

TRIANGLE MOTOR TRUCK CO., St. Johns, Mich., has been formed with a capitalization of \$50,000 to manufacture trucks. x

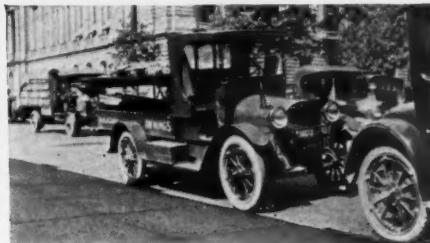
PRESIDENT POINCARE OF FRANCE has prohibited the exportation of agricultural machinery from that country. Particular emphasis is laid on motors and spare parts.

THE DOEHLER DIE-CASTING CO. has entered suit in the United States District Court of New York (Brooklyn) against The Acme Die-Casting Co., charging the latter with infringement of the Doehter Die-Casting Co.'s United States patent 1,156,073 for white metal castings and method of making same.

GOODELL-PRATT TOOL BOOK

Tool book No. 13 of the Goodell-Pratt Co., Greenfield, Mass., has just been issued. It will interest repairmen, garage dealers and all mechanics. Illustrations and specifications of 1500 tools are contained in this 432 page book. It has a red cover, and is $3\frac{3}{4} \times 5\frac{3}{4}$ in., making it convenient to carry around.

BURD HIGH COMPRESSION RING CO., Rockford, Ill., has just issued a 1917 edition of the Burd Piston Ring Directory. The book will be mailed free upon request to any member of the trade using his stationery or enclosing his business card.



Another Case of an Auto Replacing Several Horses and Wagons

Handling awnings and awning work is a simple matter for the employees of Charles A. Coye, a dealer at Grand Rapids, Mich. The simplification came with the addition of a Reo truck with a special body. It took two years for salesmen to convince Coye, and in order to make the sale, one of the solicitors designed the truck which Coye now uses. Above the regular body is a steel supported rack, and in this, the awnings ready for delivery are carried. Ladders used in hanging work are carried in the body. The idea works nicely, and it has been the means of creating a service which has increased Coye's business materially.

Previously Coye used two wagons and two horses. The truck now does the work of both these vehicles, and the saving in expense during the first year of operation was nearly \$400.

Balancing the Magnetic Torque

The Bourne magnetic truck, one of a large fleet in the service of the Atlantic Refining Company, is shown herewith in the act of performing one of the most difficult feats that could be attempted by a heavy truck. This is an illustration of the soft yet positive torque of the magnetic transmission. The Bourne was stopped with both front wheels against the curbstone. The controller lever was placed in the front point, and the gasoline engine accelerated until sufficient torque was generated to cause the front wheels to gradually climb the curb to the position shown. In this position the truck was held for several minutes, simply by balancing the torque of the engine against the pull of gravity, neither hand nor foot brake being used.

By accelerating the engine, the truck would be moved up onto the curb; whereas, if the engine speed were decreased, the wheels would roll gently back to their original position.



THE FAGEOL MOTORS COMPANY BREAKS GROUND FOR NEW FACTORY AT OAKLAND

On Saturday, June 9, the Fageol Motors Co., started active work on their new motor truck and tractor factory by breaking ground for the first unit on their ten-acre site near the Chevrolet automobile plant. The presence of the city officials, members of the Oakland Chamber of Commerce, military men and hundreds of Northern California automobile dealers and motorists added greatly to the gala effect of the occasion.

The addition of this plant to the Bay Cities' industrial life should mean much to the Pacific Coast as the new factory will soon be doing its share in supplying that region with its motor trucks and tractors. It is estimated that the first unit of the new plant will be completed in about eighty days.

The plans for the new plant call for a factory capable of producing the several lines of motor trucks, tractors and auto-

Timken worm gear dust proof; front axle, I. B. Timken with Timken bearings; brakes, internal on rear wheels; tires, front, 34 x 4 in.; rear, 36 x 7 in.

The farm tractor, which the Fageol people will build will, they state, solve the tractor problem for the orchardist and farmer. Unlike either the caterpillar or broad wheel type of tractor or the convertible automobile tractors in common use today, this machine uses a new principle for obtaining its traction. Instead of flattening the ground in front of the plow or harrow or other machinery, being pulled, this tractor draws its farm implements along after having loosened up the soil by its front wheels with their long blade-like teeth.

The new plant will be busy from the start as many orders for the different types of their motor trucks and tractors have already been booked. The following men are the company's officers and will direct its affairs: L. D. Bill, president; Frank R. Fageol, secretary and manager; Dr. Arthur E. Hackett, Rush Hamilton, W. B. Fageol and Horatio W. Smith, directors.



The Fageol Truck at the Fageol Ground-Breaking Exercises in Oakland
The actual ground-breaking ceremony consisted of blowing up twenty holes charged with eighteen sticks of dynamite each, which made a rather spectacular affair

mobiles which the Fageol people will turn out and with this idea in mind the company proposes to build their factory in a series of units, the first of which is now under way.

Located on a ten-acre site near the Chevrolet plant the Fageol Motors Co. has an ideal situation to expand. Modern facilities will be at the disposal of the engineers and mechanics to enable them to produce Fageol products with the greatest economy possible.

The line of motor trucks which the new factory will produce will consist of two, three and a half and five-ton models, embracing several distinctive features which should make them popular with all lines of business. The following specifications apply to all these types:

Wheelbase, standard 144 in., special wheelbases optional; engine, Waukesha, 4 x 5 1/4 in., 4 cylinder; lubrication, force feed; carburetor, Zenith; ignition, high tension magneto; radiator, cellular type cast shell; clutch, Borg & Beck; transmission, 3 speed, constant mesh type; springs, 41 x 2 1/2 in. front, 56 x 3 in. rear, chrome vanadium; wheels, artillery type; rear axle,

NEW PUBLICATIONS

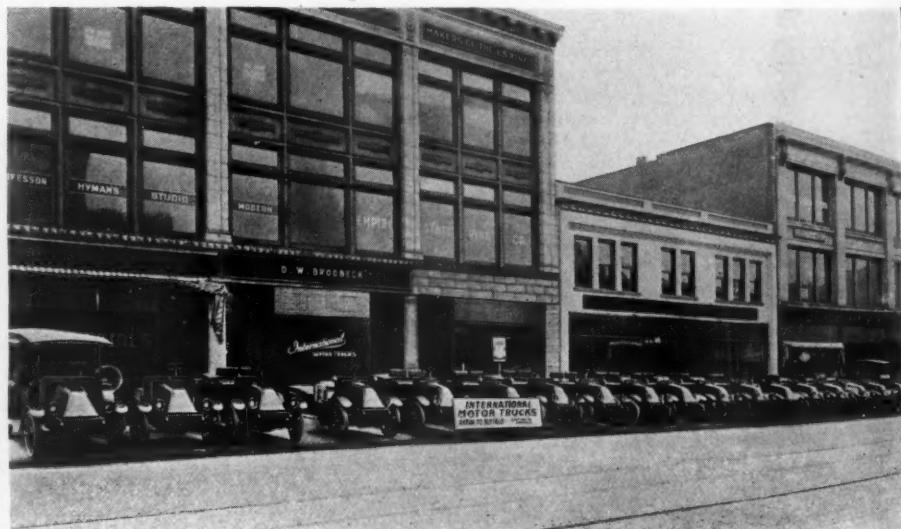
"*Supplement to Foreign Import Duties on Motor Vehicles and Accessories*," Tariff Series No. 30A. The Bureau of Foreign and Domestic Commerce of the Department of Commerce has issued this supplement to "Foreign Import Duties on Motor Vehicles and Accessories" which was published as Tariff Series No. 30, in November, 1914. This sets forth all of the changes in the customs treatment of motor vehicles in foreign countries that have been brought about by the war, and should be in the hands of every American interested in selling automobiles in foreign countries. Copies may be had upon application to the Superintendent of Documents, Washington, D. C., for five cents (money order or coin).

BOOK REVIEW

The Commercial Union Assurance Co., Ltd., of London, with offices at 55 John Street, New York City, has recently issued a complete list of automobiles, incorporating the model, type of body and list price with horse-power and collision insurance ratings. This book is a complete resume of the various cars manufactured throughout the world and affords an excellent opportunity to accurately classify any car with regard to insurance ratings or general specifications. Cars of foreign manufacturers are so specified, and the prices given are in every instance the selling prices in New York, which, of course, includes duty.

KENTUCKY WAGON MFG. CO., Louisville, Ky., has closed a contract for assembling motor ambulances for the United States Army.

DAYTON BODY CO., Dayton, O., has just completed a new 4-story brick factory building 106 x 360 ft. It will be provided with a flow system such as is used in the Ford and other factories, but has never been used in the manufacture of bodies before.

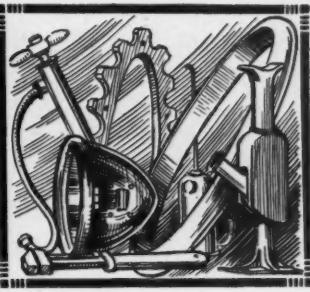


Fleet of International Motor Trucks Delivered Overland

Due to the difficulty of securing a sufficient number of freight cars, Mr. D. W. Brodeck, distributor at Buffalo for the International Harvester motor trucks, had eighteen trucks driven overland from Akron to Buffalo. The illustration shows the fleet upon its arrival at Buffalo.



TRUCK ACCESSORIES AND APPLIANCES



THE DEARBORN TRUCK ATTACHMENT

The Dearborn Truck Co., 2017 S. Michigan Avenue, is showing two new truck units, which the Dearborn factory has just added to its line. These are a 2-ton Dearborn unit adaptable for use with any standard chassis, and a new 1-ton unit, which is also universal in its application.

Both of these new units are characterized by the same sturdy and mechanical construction that characterized the original Dearborn truck units, which were designed for the Ford car exclusively. Provision has been made in their construction for overloading, the margin of safety being 50 per cent. above the rated capacity.

Unusual interest in these new units is being shown, it is claimed, by Dearborn dealers in all parts of the country and a large number of orders have been booked for immediate delivery on both types.

It is to be expected that the introduction of these two new Dearborn units will have a very definite bearing on the solution of the used car problem. Being practical for use with larger power plants than the 1-ton Dearborn units, which have been used in connection with the Ford car, these new 2-ton Dearborn units can be attached successfully to power plants of 40 to 50 hp.

Owing to the relatively high cost of upkeep on these high-powered cars, dealers have often been forced to sell them in their second hand state at prices that are less than their actual worth, and even at these prices have not found a ready market. All of the larger, high priced cars have been built along lines that will enable them, after they have reached this second hand stage, to give good service for years to come, and a combination, for an inexpensive 2-ton truck of the Dearborn unit, and one of these cars should prove a very profitable investment.

The new 2-ton Dearborn units are built with heavier frame, wheels and general all-around heavier and stronger construction to meet every condition of hard service. Their specifications are: 5-in. channel

frame. Dead axle, $2\frac{1}{2} \times 2$ in., drop forged and heat treated. Heavy 3-in. springs, 48 in. long and 9 leaves with bronze bushings in eyes. Additional relief spring over rear axle. Heavy truck wheels 34×5 in. hickory spokes and felloes, with twelve $2\frac{1}{2}$ -in. spokes. Solid rubber tires 34×5 in. $1\frac{1}{4}$ -in. pitch Baldwin roller chains and Baldwin steel sprockets.

The present prices of Dearborn units are as follows: the one-ton truck unit for the Ford car is \$350; the Universal one-ton unit for other cars is \$400; the two-ton unit for Fords lists at \$450; and the Universal two-ton unit for other cars sells for \$500.

VAPORSpray FOR APPLYING PAINTS

The Vaporspray can be used by manufacturers of all kinds of articles that are to be covered with any kind of fluid. The Vaporspray has a syphoning action which is created by the use of a venturi nozzle.

Referring to the illustration, the air enters at C, pressure being on the valve B, by holding the valve D closed. Valve B, being larger than valve D, allows the air to flow through and out at the nozzle E, causing a syphon action which draws the fluid up, out of the tube F, and sprays a very fine or large spray, according to the pressure exerted on the button. The nozzle ring E, serves the purpose of center alignment, as well as unclogging openings stopped by particles which may have dried and hardened when the spray is not in use. This self-cleaning action is effected by pressing the finger against this ring and shoving it back over the shoulder on the inner nozzle which cleanly cuts all dried particles from the inside of ring E. Then when pressure is put on button A, the air pressure forces ring E back to its place, cleaned and ready for use.

It also serves the purpose of backing up any unmixed fluid or lumps which may have been drawn up tube F, by placing a finger over the ring E and pushing button

A, this driving the air pressure back down through tube F. This, however, is never necessary if the fluid is well mixed.

The nozzle can be changed according to the consistency of the fluid used. The nozzle marked E is called the ring nozzle. The



Section of the Vaporspray

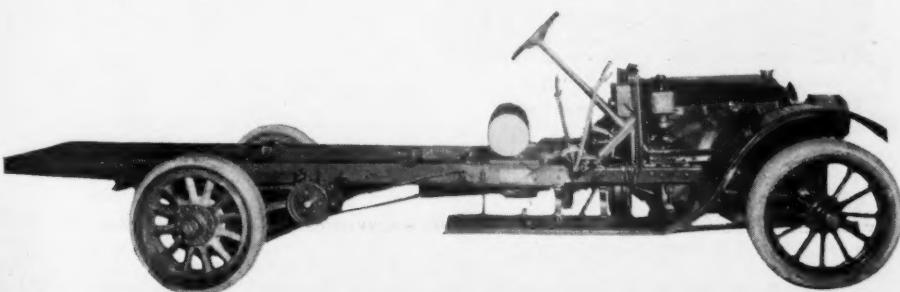
inner nozzle is the fluid nozzle. The Vaporspray has no adjustments and it can be operated under any pressure from 10 to 100 lb. The equipment of the Vaporspray includes 6 ft. of high pressure air hose with $\frac{1}{8}$ -in. pipe size connections. The price is \$16.50 f.o.b. The Vapor Valve Co., 2820 N. Spring Avenue, St. Louis, Mo., manufacture this device.

EBONITE TRANSMISSION LUBRICANT

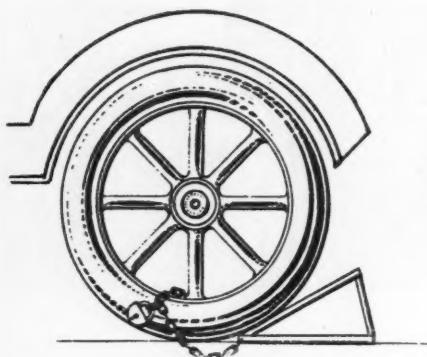
An oil specifically for lubricating automobile transmissions is being made by the Bayerson Oil Works, Erie, Pa. It is made from what is known as Franklin heavy crude, an ebony black oil. All of the lubricating value in the parent oil is said to be retained in Ebonite, and no graphite, cork, filler or other foreign substance is added.

Ebonite is characterized by good heat resistance, long wear, good lubricating qualities, a long string, and is said never to cake, dry or pack. It spreads a film coating or resilient cushion over and between the gear mesh, which prevents metal to metal contact to a great extent, with a corresponding reduction of noise and wear.

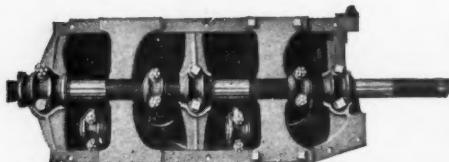
This oil is adapted for old cars, noisy timing gears, differentials, etc. One filling of a tight transmission case with Ebonite is said to last an entire season.



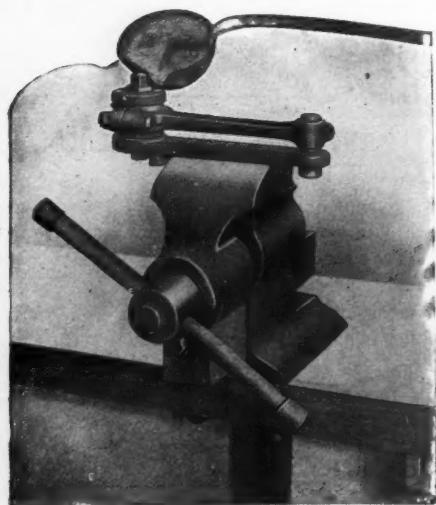
The New Dearborn Two-Ton Truck Unit Applied to a 1912 Apperson Car

**Carsafe Hobble**

This shows the Carsafe Hobble attached to the auto wheel. It prevents the car from moving on an incline or graded road, and is also a theft preventer. It is a collapsible block made of galvanized sheet steel, with a chain which locks through the spokes of the wheel. When not in use the hobble is kept in a heavy canvas bag, $\frac{3}{4}$ in. thick and 7 in. wide. The price in the sack, but without a padlock, is \$3. The sales agent is the Western Atlantic Engineering Company, 132 Nassau Street, New York City.

**Crankshaft Bushing Reamer**

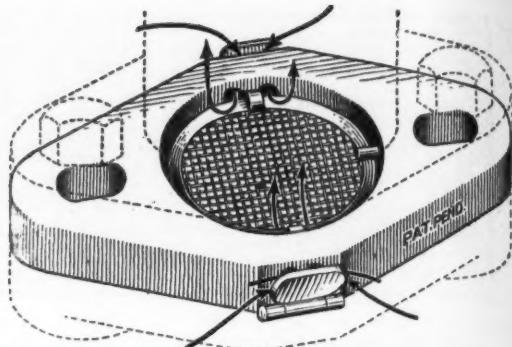
This reamer is designed to ream the three bushings of the crankshaft at one operation and to secure perfect alignment of these bearings, and is being made by the Alvord Reamer Company, Millersburg, Pa. It is said that this type of tool saves three-fourths of the time generally required for reaming, as well as the time spent in securing alignment. The price of this reamer, which comes under three numbers—3031, 3032, 3033—is \$17.50.

**Dyer Re-babbetting Jig**

The Dyer re-babbetting jig in operation, held in an ordinary bench vise. It is only necessary to remove one nut and cap to place the connecting rod of the Ford car in a position for pouring the babbitt metal. When the bearings of the rod are babbitted they regain their best qualities and last for some time. The price of this re-babbetting device is \$1.50. It is made by the G. H. Dyer Company, 155 Brookline Street, Cambridge, Mass.

**Kliegl Cleaner Stand for Garages**

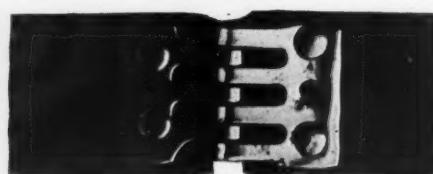
This adjustable stand is 36 in. high to the center of the four-light cluster. A large reflector placed back of the cluster aids in the direction of the light. The bulbs are protected by a wire screen. This stand is made by the Universal Electric Stage Lighting Company, 240 West Fifty-first Street, New York City, and sells for \$8.50.

**The York Carburetor Perfector**

This device is for the purpose of reducing gasoline consumption, and for increasing the power and speed of the engine. It operates by the speed of the gas as it passes from the carburetor into the intake manifold. By further breaking up the gasoline molecules and admitting air at the proper times it improves the engine's performance and efficiency. The price is \$5 complete, and the producer is the York Carburetor & Auto Accessories Company, Incorporated, 680 Woodward Avenue, Detroit, Mich.

**Brake Lining Display Cabinet**

This Garco display cabinet is furnished by the General Asbestos & Rubber Company, Charleston, S.C., to dealers and jobbers, with a stock order. It can be had stained in mission, oak or mahogany, to match the furnishings of the display room. A rod put through the center allows the rolls of lining to revolve easily, and the cabinet has a capacity for seven rolls. It is strongly built, with the Garco trade-mark lettered on top in red and gold. The initial order with which these cabinets are given must go through the jobbers who sell Garco brake lining.

**Campbell Belt Connector**

This belt connector, as may be seen, is a simple rivet-hinge device, capable of outwearing any fan belt and making a strong, durable connection. The connection is fastened by bringing the ends together and then inserting a rawhide pin, which is said to remain in place until purposely removed. The Campbell connector is made in 1 in. and $\frac{3}{4}$ in. sizes, and sells for 10c, complete with the rivets. It is made by the Perkins-Campbell Company, 632 Broadway, Cincinnati, Ohio.

**Dyer Towing Device**

This device is simple, strong and safe. It is said to positively steer the towed car. It can be attached in a few minutes. The G. H. Dyer Company, 155 Brookline Street, Cambridge, Mass., manufactures this device in two sections, one of which remains permanently fastened to the service car. The net price is \$6.

**Tire Display Rack**

A compact, durable display rack, made of steel and finished in black enamel, and to which a tire can be locked with an ordinary padlock, is shown in this illustration. It is the product of the Dow Wire & Iron Works, Louisville, Ky., and sells for \$5.

KELLEY ONE AND A HALF TON TRUCK UNIT

Following the introduction of the Kelley 1-ton truck unit, which was described and illustrated in the October issue, page 47a, the Kelley Convertible Auto-Truck Co., 332 S. Michigan Avenue, Chicago, Ill., announces a new 1½-ton unit, which is being sold for \$485 f.o.b. Chicago.

The only difference between the two units is the capacity. The 1½-ton Model K-200 unit is guaranteed for loads of 4250 lb. on the spring pads and it embodies the same general construction as the 1-ton Kelley truck attachment.

The axle is the same, except that it is heavier. The load-carrying member, gears, brakes, etc., are also heavier than on the 1-ton unit. The wheels have fourteen 2 x 2-in. square spokes. The tires are solid 34 x 4-in. pressed on. The wheelbase is 8 in. longer and the frame 20 in. longer than the lighter model. The springs are longer and heavier. The different parts are standard and can be easily replaced when lost or broken. The manufacturer furnishes any desired type of body suitable for this unit. When installed the unit makes a strong serviceable truck, useful for whatever may be required of it.

NEUTRALINE

Those who work with acid, especially storage battery workers who use sulphuric acid of about 1.400 specific gravity, will be interested in Neutraline. This is a compound of two selected grades of mineral oils combined with several neutralizing agents. One oil is light, hard, elastic and waterproof. The other oil is for body and is much softer and heavier. When acid attacks the unprotected skin the effect of the compound when applied is to form a neutralizing gas. The hard elastic oil prevents this gas from escaping by forming a coat over it and it is thus forced into the pores of the skin, neutralizing the acid which may already have penetrated. The softer oil melts at body temperature and heals and softens the skin.

Neutraline is applied to the hands and arms about four times a day to be prepared against acid contact. It is said to be healing, harmless, odorless, antiseptic and cleansing. It is sold only in 8 oz. tins at a retail cost of 50 cents per tin.

KURTZ PISTON RINGS

The Kurtz piston ring is a three-piece double eccentric, the heavy side of one eccentric being placed against the light side of the other, forming a concentric which is designed to give perfect packing, and at the same time maintain the necessary feature of expansibility in the eccentric.

The outer ring is in two parts, being held in place by a small pin which is countersunk to prevent its working loose or breaking off. The outer rings are so placed one to the other as to seal the expansion joint, making it gas tight.

This ring gives 400 lb. of compression, and is said to prevent oil from passing into the explosion chamber with this pressure behind it. In preventing such passage of oil it lessens carbon accumulation. When installing the rings in the piston, the inner rings are first placed in the groove, then the outer rings are placed, one at a time, over the inner rings. These rings are manufactured by the Canton Auto Parts Mfg. Co., Canton, O.

A GAS SAVER AND CARBON ELIMINATOR

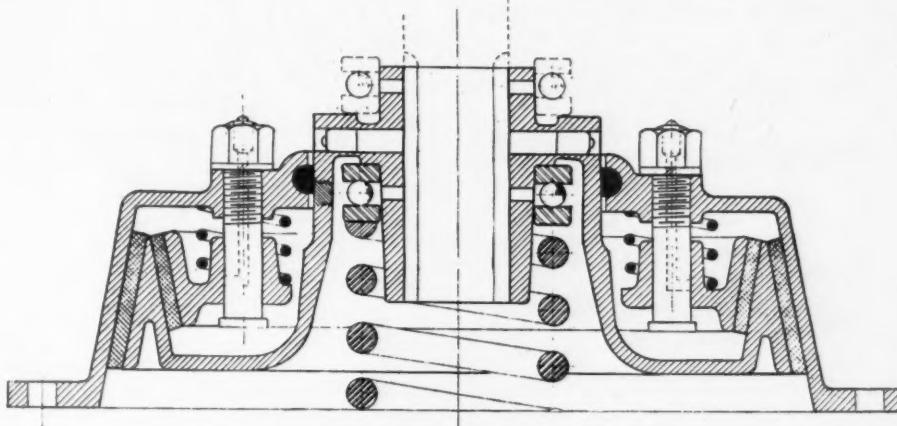
The "Fogger" is an automatic device for introducing live steam into the fuel of internal combustion engines which is being

it is connected with the water circulation and generator pipe, which, through the exhaust manifold, is connected with the intake manifold. The vacuum from the impulse of the engine acting on the diaphragm, opens and closes the needle valve, allowing water from the chamber and the air from the intake to be drawn into the generator pipe, which, being highly heated by the discharge of gas through the exhaust manifold, produces flash steam. This, by the constant vacuum or suction from the cylinders, is drawn into and thoroughly combined with the fuel vapor.

Elimination of carbon deposit, saving of fuel through more perfect combustion, reduction of shock on the crankshaft through a cushioning effect on the compression stroke and increased expansion on the power stroke due to the homogeneous mixture of steam and gas, are advantages claimed for this device. The price is \$10.

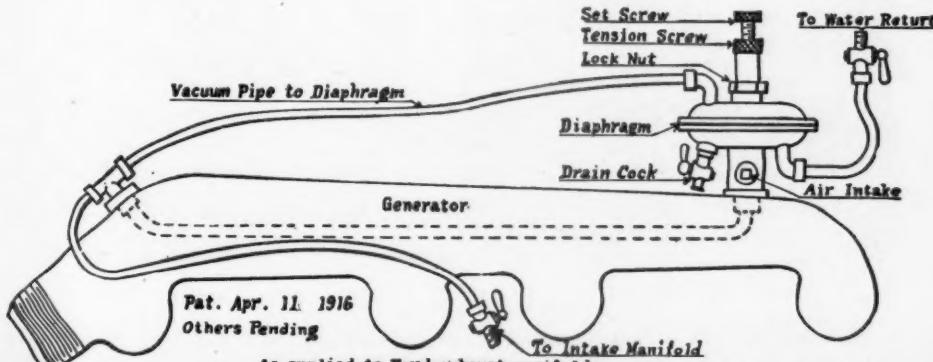
MULTIPLE CONE CLUTCH

To overcome the faults of the ordinary cone clutch various types of cones having different angles, different clutch facing materials, and supplemented with spring actuated plugs, cork and other things have been tried. The Multiple cone clutch is a result of such endeavors, and it is claimed to se-



Sectional View of the Multiple Cone Clutch

put on the market by the Motor-Steam Generator Co., 419 Heed Bldg., Philadelphia, Pa. It consists of a head or double chamber, containing a vacuum chamber, diaphragm, needle valve, water chamber and an air intake.



The "Fogger," a Device for Introducing Steam Into the Fuel of Internal-Combustion Engines

cure a smooth prime engagement, combined with a positive action.

This cone consists of a small, spring actuated, male cone, placed so that it engages at low pressure the driven member, which is a double, leather-faced cone splined onto the driving shaft; and also a large female cone, centred and bolted into the flywheel and engaging, only after the small cone is in action and under pressure, the outer cone of the driven member, thereby transmitting the greater part of the torque load. The driven cone is operated by the foot pedal mechanism as in the ordinary clutch and is seated by a single chrome vanadium steel spiral spring, the pressure from which is transmitted through a ball thrust bearing, as shown by the accompanying illustration. The large female cone also serves as a dustproof case for the complete clutch assembly.

This clutch is made by the Multiple Cone Clutch Co., Erie Bldg., Cleveland, Ohio.

STEEL COMMERCIAL AND FARMERS' UTILITY TRUCK BODIES

THE increasing demand for all steel bodies for commercial and farming purposes was the incentive for the Variety Mfg. Co., 2958 Carroll avenue, Chicago, to produce a line of bodies out of the ordinary, reasonable in their initial cost and guaranteed not to rattle, rumble or squeak.

Strength and light weight have been secured by consideration of all possible stress and strains with the result that any one of these models is claimed capable of standing up under a capacity load while adding no excess weight strain to the chassis on which it may be mounted.

All parts of the bodies are primed and baked before being put together, they are then painted and baked to prevent possible rust, varnished and enameled with high grade materials. The standard color is Brewster green, striped in gold with black mountings.

They are all so designed as to allow their being mounted on a Ford chassis without the necessity of drilling any additional holes or marring it in any particular.

These bodies are so constructed that they can be taken down and crated for shipment, thus saving an appreciable amount in freight and cartage to destination. They are so simple in construction that they can be set up in several hours. They are packed for shipment with all bolts, lock washers, etc., with complete

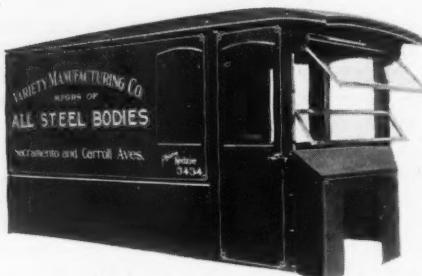
have three heavy hinges full width of panel. Seat, lazy back, jointed to fold down. Seat cushions, made of pantosote, built on frame and springs. Side and rear curtains, Model S, heavy black oiled duck.

It has the added advantage of a completely enclosed body for many purposes. Weight, 465 lb.

Model E

Model E has all the features in models C, V and S, shaped to a light express delivery body with a special driver's cab.

The main body of this model measures 46 x 60 in. inside and back of the cab, which is equipped with a fully upholstered spring seat. The 15-in. sides of this body



Model V, Variety Panel-Body Type

Curtain hangers, good straps. Floor boards, hardwood with floor irons. Flareboards, No. 14 steel, hung on heavy steel brackets extending to bottom of body.

Hinges for doors have removable pins. Doors equipped with self-locking clasps.

Model C

Model C is the leading panel body type. The loading space is 46 in. wide, 60 in. long and 54 in. high, inside and back of the driver's seat.

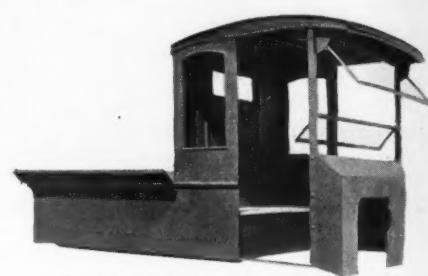
Weight—450 lb.

Model S

Model S, the leading open body model, has the same basic construction as Models C and V, with the same loading space back of the driver's seat, 46 x 60 x 54 in.

Model V

Model V is practically identical in construction with Model C, excepting that Model V is furnished with a full length, self-latching door on the right side and is enclosed on the left with a special single piece panel and a 12 x 18-in. window. All of which may be removed or replaced in about five minutes, whenever desired.



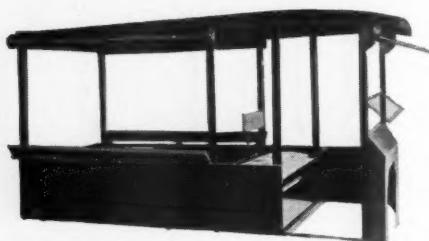
Model E, Variety Light Express Delivery Body With Cab Top

are followed up with flareboards held in place by three heavy brackets extending to the floor of the body.

Model F

Model F, the farmers' utility body, is a truck body with a loading space 46 in. wide and 60 in. long. The sides are 15 in. high. General body specifications for this model are identical with those given for Models C, E, V and S.

THE THERMOID RUBBER Co., Trenton, N.J., has increased its yearly output of Thermoid Hydraulic Compressed Brake Linings nearly 30 per cent. by the addition of a new hydraulic press equipment. This department is running overtime at full capacity, averaging an output of 37,000 ft. per day. The output last year totalled over 9,000,000 ft., but this will be increased to nearly 12,000,000 ft. this year.



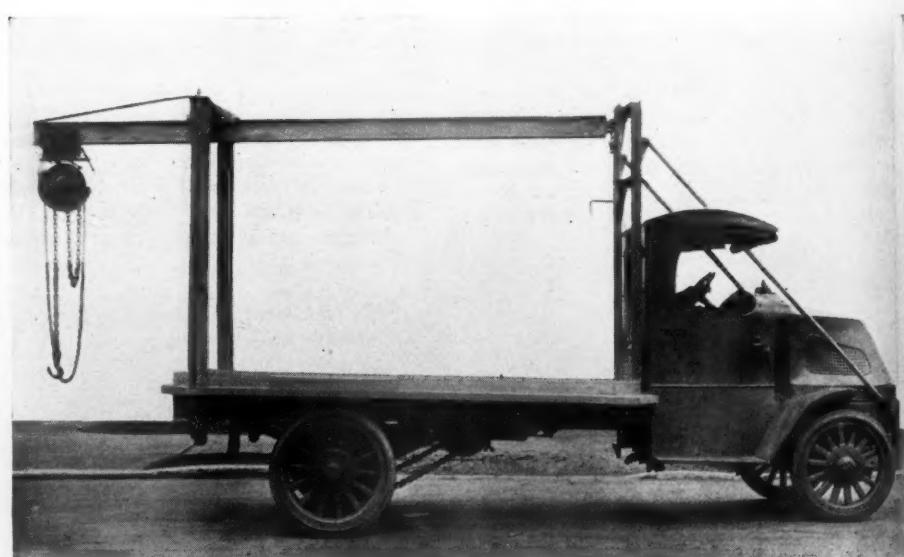
Model S, Variety Open Body

directions and the only tools necessary for their installation are a hammer and a wrench.

On all closed body styles the solid side panels are reinforced by the upright supporting felt-lined ribs, which is of great advantage for lengthy service.

General Specifications

Lower long sills, No. 10 gage steel, 2½ x 1¼-in. channel. Cross sills, No. 14 gage steel, 2 x 1¼-in. channel. Floor, No. 16 gage steel, fluted for strength. Lower sides, No. 16 gage steel, right side, 15½ x 76 in.; left side, 15½ x 100 in. Upright posts, No. 16 gage steel channel, 1 x 1½-in. flange. Large side panel, No. 22 gage, leveled, 76 x 35 in. Sides and ends of roof, No. 16 gage, moulded into form. Roof, No. 24 gage steel, grooved every 2 in. Deck ribs, No. 18 gage steel, 1 x ½-in. and ½-in. flange. Cowl, one piece, No. 18 gage steel, electric welded. Windshield, steel frame, large glass, 13 x 42 x 3-16 in. thick. Small lower glass, 7 x 42 x 3-16 in. thick. Side and back windows, opening, 12 x 18 in., double strength. Tail gates



Mack "AC" With Special Equipment

This illustration is of a Mack truck, made by the International Motor Company, of New York City, and sold to the Hydro Stone Company, Chicago, manufacturers of artificial stone. The special equipment, made by the Hendrickson Motor Truck Company, of 3538 S. Wabash Avenue, Chicago, is used to lift the heavy stones. The screw adjustment at the front allows the stone to be held horizontally on any grade.

ELECTRICALLY OPERATED GARAGE DOOR ATTACHMENT

For inclement weather and for convenience to the autoist at any time, the garage owner can install an electrically operated attachment which controls the opening and closing of the garage doors.

The Allith-Prouty Co., Danville, Ill., manufactures this door hardware from high-grade steel and malleable iron. The number of parts is reduced by its being motor-driven through the worm gears to the operating shaft, and it is said to be practically a trouble-proof device.

Simplicity and ease of application and operation are features of this convenient device, and the cost of maintenance after installation is said to be very small. It can be installed on any opening where there is 12 in. of head room. The mechanism is controlled by two push buttons placed where they will be most convenient. Pressing one button turns on the lights, unlocks the doors and folds them back clear of the opening; pressing the other button reverses the operation. An initial button, the pressing of which stops the doors immediately, is also part of the controlling system. When the buttons are placed outside the building they can be operated with a cylinder lock.

If the power is shut off, or for any other reason it is desired to operate the doors by hand, a slight pull of a lever disengages the gears so the doors can be manually operated. Provision has also been made to prevent accidents to persons or machines caught standing in the opening after the starting switch has been thrown, through a spring checking device.

After each part is tested it is assembled with a standard motor on a heavy plank for shipment. This plank can be used as a template in installing the hardware. If specifications are submitted, giving the size of the opening, the distance from the top of the door to the ceiling and the construction of the wall, the engineering department of the manufacturer will work out the details. The price can be had upon application.



"Electromatic" Type 10-20

Electrically operated door opening and closing device, with a check locking appliance and light connection. Can be operated from the outside, as shown

A GARAGE AND REPAIR SHOP STAND

For the more convenient handling of engines, transmissions, axles, etc., after removal from the chassis, the "Buckeye" engine stand was designed. It is a universally adjustable device, in which any type of en-



The "Buckeye" Engine Stand

gine may be clamped whether of the plain box type or three point suspension.

The "Buckeye" has a wide range of usefulness, not being confined to engines alone; transmissions are clamped up in practically the same manner, axles are securely held by bolting to the spring seats and they make a fine truck to move bodies to other points of the shop. Engines may be belted-in or run-off in them, enabling the workman to make close inspection and adjustments.

Heavy black iron pipe and 1½-in. seamless steel tubing form the frame proper; all castings used except the tool tray and the wheels are malleable iron.

This stand is manufactured by the Central Brass & Fixture Co., Springfield, O.

Specifications

Height, with casters, in.	32
Height, without casters, in.	26
Width, in.	32
Length, in.	44
Weight, complete, lb.	160
Weight, crated for shipping, lb.	190
Crated dimensions, in.	10 x 29 x 47
Price	\$26

REVOLVING SCREW RACK

To aid in the systematic keeping of such small stock as washers, screws, cotters, etc., the New Britain Machine Co. of New Britain, Conn., is making the revolving screw rack.

This rack in its regular form consists of 48 compartments, arranged in four circular shelves of different numbers of compartments each. The rack is strong enough to sustain a weight of 500 lb. of stock. The capacity of the divisions of the upper shelves is about two quarts. The shelves below are twice as large as those above.

The revolving top is supported by a hardened and ground bearing and it is said to need only a slight touch to start revolving. Holes are drilled in the base by which the



Revolving Screw Rack

Containing forty-eight compartments and four circular shelves. Additional shelves and partitions may be added if desired.

rack may be fastened to the floor but the makers claim that the rack is sufficiently stable to obviate the necessity of such fastening.

The number or size of the partitions may be changed as desired. The height as shown is 50 in. which may be varied in multiples of 6¼ in. The diameter is 27 in., and ready for shipment the rack weighs 650 lb. The net price of the rack as shown is \$52 and the cost of each additional circular shelf with eight compartments is \$5. Additional partitions in sets of eight cost \$2.40.

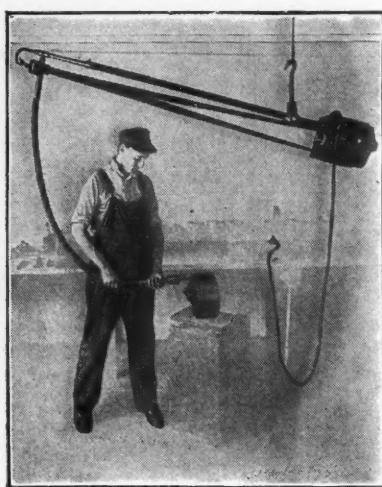
A RADIATOR COMPOUND

For stopping leaks in radiators the Whiz compound is claimed to effectively serve its purpose and to be harmless to the circulating system. A package containing 5 oz. and retailing for 75 cents is sufficient for a radiator with a capacity of 8 gals.

If the radiator starts leaking the contents of one of these packages is poured into the radiator and the engine is allowed to run for ten or fifteen minutes. The water is then drained out and the radiator is filled with fresh water ready to continue its journey. This compound is made by the R. M. Hollingshead Co., Camden, N. J.

STOW FLEXIBLE GRINDER

This adjustable grinder is mounted on a truck, making it easily transportable to any part of the shop. It is equipped with a Stow multi-speed direct-current motor



The Stow Grinder in Action

giving a range of speed from normal to 100 per cent. above normal, thus securing the proper cutting speed for new as well as worn wheels. An alternating-current motor which runs at a constant speed but to which extra pulleys can be attached for a desired speed, can be had instead of the direct-current type.

By means of a swiveled suspension work can be carried on over a large area. This grinder is made in four sizes: No. 4 is 6 in. diam. by 1 in. face; No. 5 is 8 in. diam. by 1 in. face; No. 6 is 10 in. diam. by 1½ in. face; No. 8 is 12 in. diam. by 2 in. face. This flexible grinding tool is made by the Stow Mfg. Co., Binghamton, N. Y.

PNEUMATIC STAYBOLT CLIPPER

A pneumatic staybolt clipper which cuts the face of the staybolt square and the proper length for riveting with an average, according to the manufacturer, of 780



Staybolt Clippers

Cut the face of the bolt square, the proper length, and at an average of 780 bolts per hour

an hour, is offered to those who find such a device needed.

This clipper cuts bolts of any length and from the side, and is claimed to leave the bolt as tightly fixed as when first put in. It is light, convenient to handle, durable,

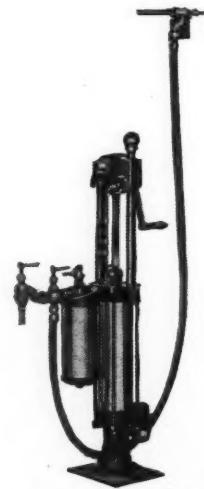
well built and requires little space in which to operate. The cutting knives are inserted to be easily replaced when worn.

This device is manufactured in three sizes: size A, with a capacity up to 1½-in. threaded bolts, weighs 210 lb., and is sold for \$350; size B, with a capacity up to 1¼-in. bolts, weighs 170 lb., and is sold for \$300; size D, cutting bolts up to 7/8-in., weighs 65 lb., and is sold for \$225.

The prices quoted above are subject to change without notice by the producer, the Helwig Mfg. Co., St. Paul, Minn.

BOYLE-DAYTON PUMP, MODEL No. 25

The Boyle-Dayton Co., Los Angeles, Cal., is offering to the trade a gallon self-measuring pump of the long distance type. It measures an accurate gallon, half-gal-



The Boyle-Dayton Pump

lon, quart or pint at one stroke. The arrangement of the measure stops on a threaded steel rod, provides a positive and simple adjustment.

The pump is well constructed throughout. The material and workmanship are high grade. All materials are carefully selected and machined. The gear rack and gears are milled steel. This feature insures smoothness of action. The cylinder is heavy seamless brass. The valves, plunger, stuffing box, etc., are also brass. The pump is strong, durable and easy to operate. The standard finish is red and the trimmings are nickel-plated, which gives a neat and attractive appearance.

The standard equipment includes lock, discharge register and a two-way discharge. A tank of any desired capacity may be used in connection with this pump. The material used is high grade galvanized steel, riveted, heavily soldered, thoroughly tested and painted. These tanks are furnished with three flange openings for vent, fill and suction pipes. The standard equipment includes measure stick, vent cap, suction line within the tank, special double foot valves, union and double fill pipe with strainer, cap and lock.

W. E. KENYON, Chicago, Ill., Western distributor of the Stewart truck, has moved to 1714 Michigan Ave.

THE FAULTLESS AIR COMPRESSOR

The Faultless air compressor is a single-cylinder, single-acting, air-cooled machine, that requires from 1 to 2 h.p., depending on the speed and air pressure maintained. A pressure as high as 300 lb. per sq. in. can be developed and a constant pressure of 200 lb. can be maintained without overheating.

The speed recommended for constant running is 300 r.p.m., but a speed of 400 r.p.m. for short intervals is said to be perfectly safe. The capacity at 300 r.p.m. is about 5 cu. ft. of free air, at 400 r.p.m. is over 6½ cu. ft.

The intake is at the top. The crank-case is enclosed and dustproof, and the working parts are splash-lubricated by the oil in the base, which eliminates grease and oil cups. The flywheel is turned and balanced, weighs 45 lb., and is 14 in. diameter. The tight and loose pulleys are 13 in. diameter, 2½-in. crowned face, and weigh about the same as the flywheel. The valves are of special design poppet type and are placed on the head, from which they can easily be removed by taking out five bolts.

The base, cylinder, piston, flywheel and pulleys are made of close-grained iron; the connecting-rod, all bearings and bushings are bronze. The machine is 23 in. high



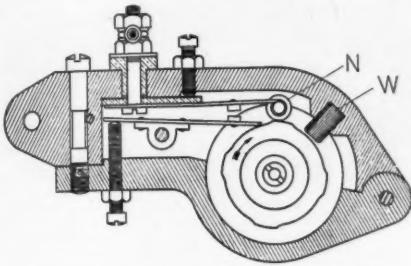
The Faultless Air Compressor

and occupies a floor space 15 x 19 in. The capacity is 4 to 7 ft. of free air per minute and the complete machine weighs 130 lb. It is finished in engine-green enamel, with aluminum trimming, and sells for \$32.90. It is made by the Faultless Engine Co., Kansas City, Mo.

ELECTRIC WHEEL Co., Quincy, Ill., owing to the increased business in the manufacture of gasoline tractors, will erect two new buildings, which, with their equipment, will cost nearly \$100,000. Upon the completion of these buildings the output of the tractor factory will be doubled. Nearly 1000 have been turned out during the last year. One of the new buildings will be 50 x 160 ft. and the other 90 x 205.

PITTSFIELD DISTRIBUTOR

The Pittsfield Spark Coil Co., Pittsfield, Mass., has developed a distributor of unit construction which makes a mechanical make and break independent of spring action, doing away with trips, hammers, and other such devices. This positive action is said to insure a perfectly synchronized

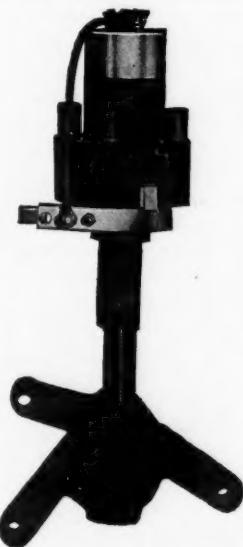


Sectional View of the Pittsfield Distributor

Attention is called to the simplicity of construction and the absence of spiral springs, trips, hammers, etc.

spark of all speeds, thereby eliminating the necessity of using unreliable automatic advances to overcome a lag in the spark due to spring action.

The make-and-break arms run on a cam wheel N, which is adjustable through an expanding screw. A wick W supplies oil to the cam and roller N. This roller carries one of the contact arms on the cam as can be seen from the illustration. The other arm runs beneath and before the upper one and by the rotation of the cam the two



The Distributor Encased and Finished

The distributor and coil are in one unit, and the finished product is small, compact and neat

are brought into contact and released. This is a purely mechanical make and break and properly synchronized regardless of the speed of the motor. The illustration shows a four-cylinder cam but the distributor is also made for six, eight and twelve-cylinder motors.

A special bracket for installing this distributor on Ford cars can be obtained. This distributor is said to do away with the timer and coils and with the vibrator troubles experienced by Ford owners. It insures a smoother running engine by delivering a good hot spark at all speeds.

Full instructions for installing and adjusting are furnished with each distributor, which can be obtained from the Pittsfield Spark Coil Co., Pittsfield, Mass.

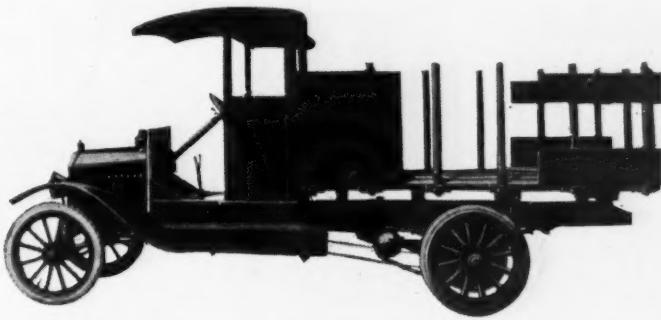
ONE-TON TRUCK UNIT FOR FORDS

For \$385 Graham Bros., Evansville, Ind., are offering a unit which, when attached, will convert the Ford car into a one-ton truck. Because the Ford cars are numerous and familiar to every mechanic they can be repaired easier, have broken or lost parts replaced quicker and are therefore best suited for converting into a truck.

The equipment offered by the Graham Bros. consists of a unit, a cab and a body. It can be easily and quickly attached, no special tools being needed. The Ford rear wheels are removed and the sprockets attached to the Ford hub in their place. The tread of the unit rear wheels is the standard 56-in.

The Graham frame surrounds and reinforces the Ford frame, extending to the very front of the chassis. The unit is bolted to the front, sides and rear of the frame. The rear axle assembly on the

This Unit is Offered Complete With Cab and Body as Shown



Ford becomes a jackshaft, rigidly held in place by specially designed bearings. According to the needs of the truck the unit can be had with either an express or a stake body. The weight of the Ford chassis with the Graham unit but without the body is 2150 lb., and it has a carrying capacity of 2000 lb. dead weight and 50 per cent. overload.

The unit is composed of:

A $2\frac{1}{4}$ x $1\frac{3}{4}$ -in. Hess axle of solid-forged carbon steel. The axle collars and hub bases are solid-forged to the axle.

Oversize roller bearings from the Bock Bearings Co.

Brakes having an expanding space of 14 x $2\frac{1}{2}$ in. The foot brake of the original Ford transmission is retained. The emergency brake runs to a large, cast-iron, brake drum on the rear truck wheels. The ample braking space insures safe and good braking.

Hess springs of high grade steel, semi-elliptic on each side at the rear, 2 in. wide, 42 in. long. The springs are strengthened by means of extra heavy hangers and fittings.

Steel, mill-cut, detachable and interchangeable Cullinan sprockets.

Brake drums bolted to the rear wheel by 12 bolts. Radius rods constructed so that they will give a true radius on the center of each sprocket and giving uniform tension with the aid of a special adjusting bolt.

A Diamond chain all the links of which are removable.

12 heavy 2-in. spokes of hickory.

32 x $3\frac{1}{2}$ -in. tires of the pressed-on type.

The drive is by a double chain ($\frac{3}{4}$ in. diameter with a roller $\frac{5}{8}$ in. wide and of a $1\frac{1}{4}$ -in. pitch) of heavy roller type for steel cut sprockets. These heavy roller chains are said to have an ultimate strength of 19,000 lb.

The frame is 168 in. long, 32 in. wide and is constructed of 1 9-16 x 4-in., $5\frac{1}{4}$ -lb. channel iron. The cab is securely ironed and braced. Its roof is slatted with 30 slats and covered with waterproofed, black-oiled duck. The three ribs are moulded to shape. The end panels are light, finished cottonwood; cab sills or base and posts are of heavy ash; top rails of cottonwood; mouldings are poplar, white leaded, to make them impervious to water. The black, oiled duck back curtain is fitted with a large mica light. The "lazy-back" on the driver's seat and cushion are padded and covered with imitation leather.

The express body is braced and ironed with sills of ash, cottonwood side flareboards and panels, heavy ash bars and oak

floor. The loading space is $45\frac{1}{2}$ x 106 in. The end gate is heavy, ironed and with a full chain.

The stake body is also braced and ironed with ash sills, ash bars, oak floor, bolted pockets and hickory stakes. The stakes are 36 in. high and the loading space is 55 x 112 in. Repair parts can be obtained at prices proportioned to the cost of the entire equipment. This unit, cab and body come painted in mirror grey or royal blue, and full instructions for attaching are given with each shipment.

ENAMEL AND CARBON REMOVERS

For removing baked enamel from any kind of metal, the Dengre Baked Enamel Remover Co., Inc., Birmingham, Ala., makes a liquid that is applied with a brush. After it has been on about 30 or 40 minutes it is claimed that the enamel can be brushed off with a straw broom or a rag. The list price is \$2.50 per gallon. Dengre carbon remover is also being produced by this company. This is guaranteed to remove all carbon from an engine without injuring it in any way. From one to two ounces are put in each cylinder, through the petcocks or spark plug holes and allowed to stand several hours. The carbon is then ready to be removed. The price for a quart is \$1.50; pint, 90 cents, and half pint, 50 cents.

DEVICE FOR SHOWING THE AMOUNT OF WATER IN THE COOLING SYSTEM

A very important part of an automobile engine is the cooling system and to prevent insufficient cooling, which causes overheating, followed by its disastrous results, the Drake hydroscope has been evolved. The advent of this hydroscope makes possible the ascertaining of the amount of water in the radiator, without removing the filler cap and peering in.

The Drake hydroscope eliminates any chance of overheating by calling attention to the trouble at the start—before any harm comes to the engine. By an ingenious arrangement a fountain of water is maintained in the hydroscope as long as the proper amount of water is circulating through the



Model D

Is placed on the instrument board. It sells for \$25

cooling system. The hydroscope quickly shows any derangement in circulation or loss of water.

If the loss is not excessive this hydroscope will continue to register even a scant circulation, but as soon as the water drops low enough to stop circulation, the fountain stops operating entirely.

Where cars are operated in temperatures below freezing, an attachment is provided by which any tendency to freeze will be shown. The Drake hydroscope is illuminated by a lamp contained within the device, so that its operation can be plainly seen even on dark nights. This illumination can be controlled by an independent switch or may be wired to operate on the regular lighting switch. The lighting is arranged to prevent the rays from shining in the eyes of those in the car.

The Drake hydroscope costs nothing to operate, as it uses no power. It requires no gears, chains, or other similar attachments. It is inexpensive, requires no attention and, it is declared, cannot get out of order or rattle and is silent in opera-

tion. A few simple connections are all that are necessary to install it.

Two models are made, Model C for attachment to the radiator cap and Model D for mounting on the instrument board,



Model C

Attached to the radiator cap, and costing \$15

which can be obtained complete with instructions for installing from the Drake Mfg. Co., Reed and Lake Streets, Milwaukee, Wis. The price of Model C is \$15 and of Model D \$25.



Sternwear Pneumatic Inner Tubes

An air-filled inner tube of patented construction, and built by the Sterns Tire & Tube Company, St. Louis, Mo., is claimed to eliminate punctures and blowouts. With it an old tire can be used for miles without any tire trouble. This inner tube has been put to numerous tests to prove its puncture-proof qualities.

In the illustration can be seen a section of the Sternwear inner tube, showing the patented construction, which is claimed to give some twenty thousand miles service without puncture or blowout. The tubes are made in all standard sizes for pleasure cars and trucks.

The CHILTON ideal—honest circulation; results to advertisers—fully exemplified in the CCJ

A. E. WHITE'S PATENT PISTON RING

Victor piston rings, produced by the A. E. White Machine Works, Eau Claire, Wis., are claimed to have all joints permanently and effectively sealed and not to leak. These rings are composed of two



The Victor Piston Ring

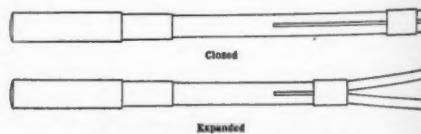
concentric sections, each having tapering sides which provide for even expansion and help maintain a perfect circle on the outer circumference, exerting uniform pressure and coming in contact with the inner surface of the cylinder at all points. Having the heavy part of one section opposite that of the other section tends to equalize the pressure.

The ends of each section are lapped between the inner and outer walls of the ring and this prevents gas from escaping to the under side of ring and forming a carbon deposit which would, eventually, clog the ring action and prevent it from accomplishing the purpose for which it was intended.

All Victor piston rings are made from individual castings of a special grade. When the rings are finished, the original scale of the casting is left on the inside which tends to give the ring long life and lasting resiliency and to prevent the set or distortion which usually occurs when rings made from cylinders or pots are assembled on the piston head.

All rings are finished by special grinding machines designed for the purpose. They are slotted, then sprung together and ground to the exact diameter of the cylinder. The price per ring up to 4 in. diameter is \$1, above that size, \$1.25.

MOTOR TRUCK CLUB OF AMERICA, New York City, has added 200 new members as a result of a four-day intensified campaign carried on by ninety of the members, who formed themselves into thirty committees of three each and personally invited prospective members to join.



The Jiffy Bushing Extractor

A compact, simple little tool for removing bushings from the steering knuckle, spindle arm and spring, is being marketed by the G. H. Dyer Company, 155 Brookline Street, Cambridge, Mass. This device is made of tool steel and is neatly finished. It is a convenient and durable help to repairmen and owners who do their own work. The price is \$1.25 each.

THE MASTER GAS-SAVING DEVICE

A small, neat device for saving the consumption of gas while at the same time increasing the mileage, is being offered to the trade by Lovelace & Horken, 448 N. Capitol Ave., Indianapolis, Ind.

This little device supplies air to the intake manifold at all times, thus precluding

**The Master**

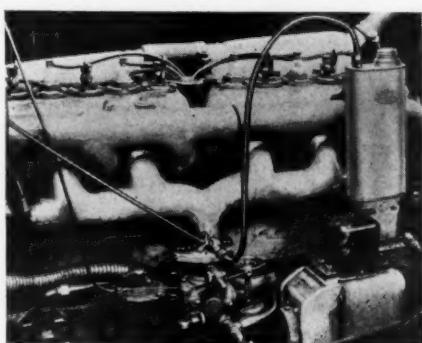
A simple and strongly constructed gas-saving device installed near the carburetor

the possibility of a partial vacuum. It works automatically and is adapted to any car without adjusting the carburetor. This accessory can be used as a primer by inserting a little gasoline after pressing down the ball on the valve. It is claimed to be an effective carbon eliminator.

The installation is accomplished by drilling a 7-16 in. hole as near the carburetor as possible and tapping with a $\frac{1}{4}$ -in. tap. The price is \$3.50.

S & H GAS SAVER

The S & H gas saving device introduces moisture into the gasoline vapor coming from the carburetor. This makes a more

**The S & H Gas Saver Installed on the Car**

powerful explosion and no carbon deposit remains. By running water from this device through the engine when it is running at about 15 m.p.h. old carbon is loosened and carried off.

To prevent freezing of the water in winter about 35 per cent. alcohol is added to the water in the container. This lowers the freezing point to 15 deg. below zero. The installation of this device is easily accomplished in 30 minutes. The attachment does not harm the car and there are no

moving parts or materials that will wear out easily. The action is simple and positive and the maker claims that from 10 to 40 per cent. more mileage, more power and more speed result from the use of S & H. It is sold by the S & H Mfg. Co., 427 Palace Bldg., Minneapolis, for \$6.

AUTOMOBILE VALVE GRINDER

The automobile valve grinder, No. 288, made by the Goodell Pratt Co., Greenfield, Mass., will be found very convenient and effective. By means of a simple operating mechanism the spindle is caused to rotate back and forth when the crank is turned continuously in one direction. The cast iron casing, containing the working parts, gives sufficient weight to the tool to make additional pressure on the valve seat unnecessary.

Each tool has a polished hardwood crank handle and a lignum-vitae head. The frame

**The Goodell-Pratt Automobile Valve Grinder**

is finished in red and black enamel. An adjustable spanner and a blade are provided which makes the tool suitable for different types of valve heads. This valve grinder is 10 $\frac{1}{4}$ in. long and weighs 3 $\frac{3}{4}$ lb. The price is \$3.

WINCHES FITTED ON TRUCKS

A 3½-ton Federal truck in the service of the line foreman of the Detroit fire department was, in the early part of 1916, fitted with a type "A," O. K. winch which is made by the O. K. Clutch and Machinery Co., Columbia, Pa. It was connected up to the secondary shaft of the transmission by

means of a special clutch, together with sprockets and a Whitney chain, and was used to pull the heavy lead-covered underground cables through manholes. The winch is mounted on the front end of the loading space of the truck, just back of the seat, where it is handy for operation by the driver. A throw-out lever is connected to the small clutch on the truck and is located on the back of the seat, within convenient reach of the operator when he is using the winch. There is also a throttle control close to this lever so that the speed of the engine can be regulated as required. The cable drum is 9 in. diameter, carried on a 2 $\frac{1}{4}$ -in. shaft, and has a capacity of 1000 ft. of $\frac{1}{2}$ -in. steel cable. It is geared at a speed of 75 ft. of cable per minute. The drum has a pulling capacity of 4000 lb. on a straight pull. There is a nigger head on the end of the cable drum shaft and this head is arranged to operate independently on the drum. The winch clutch is of the cone metal friction type and is made integral with one end of the drum, allowing the drum to run free or engaged, as required. The winch is equipped with a ratchet and pawl, with a suitable handle for holding the load in any desired position. An asbestos lined band brake is connected to the winch drum and is operated by a foot lever which is also in a convenient position, so that the operator does not have to move out of place to perform any of the functions necessary to control the winch. The weight of the winch is about nine hundred and fifty pounds.

THE MIFFLINBURG UNDERTAKER BODY

An undertaker body, weighing approximately 750 lb. before shipment, can be purchased from the Mifflinburg Buggy Co., of Mifflinburg, Pa. This body has a drop sash at the driver's seat and is fitted with a chair rack. It can be equipped with nickel mounted casket or rough box retaining posts at an extra charge, if desired.

The inside dimensions are 7 ft. 6 in. long, 3 ft. 8 in. wide and 4 ft. 8 in. high. Freight charges and price can be obtained by addressing the builder.

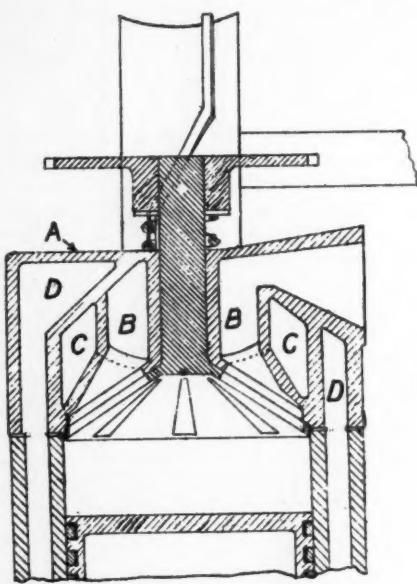
UNITED MOTORS Co., Grand Rapids, Mich., will make trailers and tractors in addition to its large line of trucks. A new building will be erected for this purpose.

A Type "A" OK Winch Mounted on a Three and a Half Ton Federal Open Express Body Truck.



NEW FORM OF ROTARY VALVE

D. J. Bullinger, New Haven, Mo., has designed a new type of rotary valve which is said to embody the desirable features of the multiple valve construction, yet eliminate the objectionable noise and complicated mechanism of the poppet valve. One



Section of New Rotary Valve

of the features of this valve is that it makes but one revolution to 16 of the crankshaft. Thus an engine having a rotative speed of 3200 r.p.m. will have a valve speed of only 200 r.p.m. This slow speed reduces wear and results in long life for the valve mechanism.

Advantages of this valve are that it has no reciprocating parts, can be reground and has much less friction surface. The number of parts of this valve for a four-cylinder engine, including cams and cam-shaft, is 25.

The illustration is a sectional view of the valve as it appears when assembled in the cylinder head of the engine. The valve cage A is cast integral with the cylinder head. This valve cage contains both the intake chamber B and the exhaust chamber C. The intake chamber B forms the center and upper part of the cage, while the exhaust chamber C is located on the outer circumference of the valve cage. By this arrangement the center of the valve, which is furthest from the water jacket, is kept cool by the intake gas. It also permits the exhaust gases to heat the intake gases before they enter the cylinder. The exhaust chamber is cooled on the inside by the intake gases, and by the water jacket D on the outside.

LUBRIOIL

A grade of oil that is claimed to be of superior quality for automobile use is offered by the Moon Specialty Co., 14 Dover St., New York City. According to the manufacturer this oil is the result of the selection of the best oils of practically every refinery in the country and after a studied process of elimination the resultant is claimed to be of a very high grade.

Plenty of the right kind of circulation means quantity results to advertisers in the CCJ

Lubrioil is produced in two grades "AA" and "A." The "AA" grade is of a finer quality than the "A" and is manufactured for use in all cars. It is adapted for use in racing cars which demand the most efficient lubricant. It is claimed that the oil has a body that will prevent carbon deposits and burned bearings, and will flow uniformly through all parts of the lubricating system and will prolong the life of the engine.

In barrel lots the prices of grade "AA" range from 60 cents per gal. for light to 75 cents per gal. for extra heavy. These prices increase as the quantity ordered diminishes and any quantity smaller than $\frac{1}{4}$ -barrel costs 15 cents per gal. more than in barrel lots. The prices of grade "A" range from 45 cents per gal. for light to 60 cents per gal. for extra heavy, and the prices for quantities less than $\frac{1}{4}$ -barrel are conditioned the same as for grade "AA."

UNIVERSAL PISTON RING

A two-piece piston ring, manufactured by the Albany Hardware Specialty Mfg. Co., Albany, Wis., is being marketed as a ring composed of two really eccentric rings, fitted together sideways in concentric form by cutting each ring down to half its width and thickness, but leaving a crescent shaped flange on the inner surface or circle of the thick side of each ring. This flange extends nearly half way around the inner side and each ring is left of full width as far as the flange extends.

When the two rings are placed together with the openings diametrically opposite,



A Two-Piece Piston Ring

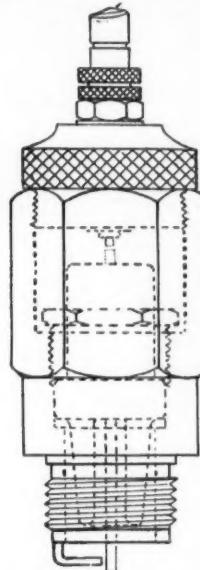
Said to be absolutely proof against leaking, and durable, with a greater expansive power than a single, solid, eccentric ring.

the outer walls of the flanges lie against the inner surface of the thin side of each engaging ring. This seals the openings of both rings completely. It is declared that this piston ring cannot leak and that it possesses greater expansive force than a single solid eccentric ring, and hugs the cylinder wall perfectly with equal pressure all around.

THE PROTECTO SPARK PLUG

A spark plug that is especially durable and effective in operation is the Protecto. It is so called from its protection against breakage of the porcelain by the slipping of a wrench, against short-circuiting when too much oil or gas is used, and against too tight an adjustment when attaching the cable to the cap. Adjustments are unnecessary because the plugs are accurately set at the factory.

The plug consists of a steel shell which extends above the top of the porcelain and protects it from breakage. Above the steel shell is a fibre insulation cap, on top of which are a steel washer, a lock washer, a binding nut and a protecting cap. There is a slight intensifying gap of .025 in. between the top terminal post and the central

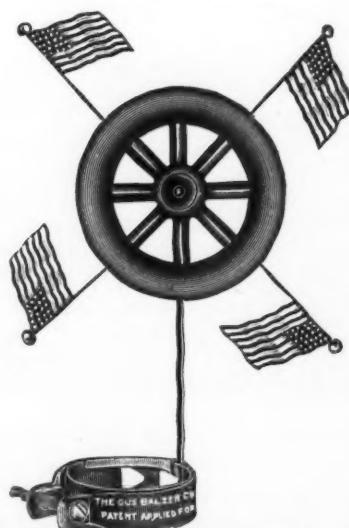


A Sectional View of the Protecto Spark Plug

electrode. The sparking point is of pure nickel and the central electrode is cemented into the porcelain.

These plugs are water tight and are sold by the Vital Mfg. Co., of Cleveland, Ohio, for \$1.50 each.

MENOMINEE MOTOR TRUCK CO., Menominee, Mich., has received an order for commercial cars amounting to \$2,000,000 from the Claud Nankivel Co.



A Patriotic Novelty

This is a new automobile specialty in the form of a patriotic emblem being made by the Gus Balzer Company, 1777 Broadway, New York City. It consists of a light metal, painted auto wheel, surmounted by four waving celluloid flags, soldered into the wheel. This novelty is only $7\frac{1}{2}$ in. over all, and is clamped around the neck of the radiator cap. The wheel revolves on a metal axle by a slight air pressure. It retails for 50c.

BARNETT DELIVERY BODIES FOR THE FORD CHASSIS

Various styles of commercial bodies for the Ford chassis are being offered by the Barnett Body Co., 1230-2-4 South Main St., Los Angeles, Cal. These bodies are made to fit any model "T" chassis and are interchangeable with the Ford touring and roadster bodies. They are built in three grades: Grade A, grade B and grade C. Their construction is said to enable them to withstand the various climatic and hard road conditions of the Mountain and Pacific States.

Grade A

Grade A is the highest grade of body made by the Barnett Co. Seasoned hardwood is used for the sills, frames, doors, etc., which are ironed and braced to prevent the body from rocking. The panels and doors of the panel top body are of 20-gage, cold-rolled, patent leveled, three-press, resquared and oiled, anti-rust automobile steel. Felt pads are placed between the steel panels and posts to prevent rattling. The roof is solid slatted and covered with heavy oiled duck. Acme door locks are used. No soft wood is used on the best grade body and steel panels replace wooden ones because the wood panels crack and split. All the sub-sills are made of eastern white oak and measure 2 x 1 3/4 in.

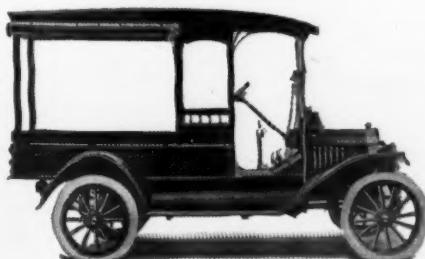
Grade B

In making grade B the material selected and the construction are not given the same attention as the better grade. The painting and finish are not as well done and other differences make possible a lower price.

Grade C

Grade C or the "Competition" grade body is made of quality material by good workmanship claimed to be in perfect harmony with the price. It is constructed mostly of soft wood with open slatted tops covered with drill and having drill curtains. The body is of lighter weight and panels and doors are of lower quality metal. It is fairly well braced, ironed and finished.

The complete equipment for grades A and B consists of a soft spring cushion, a special filler dash and parts for attaching, a pair of windshield braces, a pair of rear fender brackets, a combined rear lamp and license bracket and two compartments under the hinged seat lid for tools, packages, etc. Each grade is sold with or without the complete equipment.



A Special City Grade Body No. 930

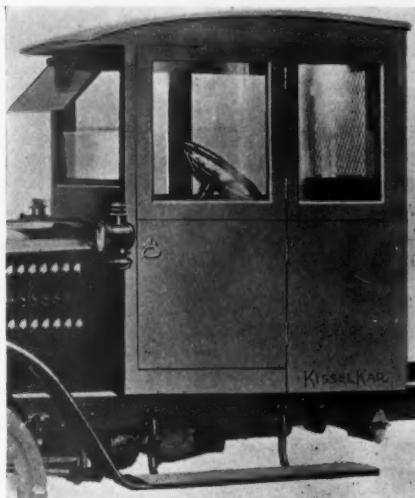
This body is painted dark green, and has a load space 43 in. wide, 63 in. long, and 54 in. high. It costs \$100, attached to the chassis, in Los Angeles.

All the bodies are collapsible for transporting and the regular styles are carried in stock, trimmed and painted for immediate delivery. The price of all the bodies is f.o.b. cars or boat at the shipping point. It takes from 20 minutes to 2 hours to convert a Ford pleasure car into a commercial car, according to the style or body.

THE KISSEL ALL-YEAR CAB

An innovation that is destined to have an effect on the comfort of motor truck drivers is that of the all-year cab, originated, designed and built by the Kissel Motor Car Co., Hartford, Wis.

It is a new adaptation of Kissel's original convertible idea, giving to truck driv-



The Kissel All-Year Cab in Winter

Showing the winter enclosures, consisting of rain-vision windshield, side, door and rear windows, that are easily and quickly attached to the standard open cab, making it weatherproof.

ers a closed, warm cab in winter, which can be easily and quickly changed into the Kissel standard open cab in summer.

It stands a little over 5 ft. from chassis frame to roof and the cab frame is of hardwood, bolted and locked. All sides and doors are covered with especially treated sheet metal enabling the cab to withstand the twists of the frame when negotiating rough roads. Instead of the wooden dash the all-year cab dash is of heavy plated metal, giving unusual substantiality.

It seats three with plenty of leg room. Tank and tool compartments are under the seat. Doors on each side measure 25 in. wide. Metal pockets are furnished on both sides of the cab for time, tire, gasoline and other mileage record cards and books.



Express Body

Painted and attached, the price of this body is \$95. It is 8 ft. long, 44 1/2 in. wide and 18 in. deep, inside measurement.

Special Pittsburgh glass is furnished for the doors, sides and rear window, which has a heavy wire protection screen. A rain vision windshield is also included with the winter equipment.

To change the all-year cab into the Kissel standard open summer cab, the winter inclosures are easily and quickly removed.

This special cab, which is exclusive with the new Kissel trucks, is in its open form, without the winter inclosures, standard equipment on all the new Kissel truck models excepting "The Flyer" light delivery car. The winter inclosures for the all-year cab cost \$50 extra.

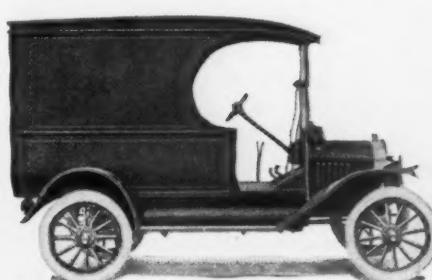
TESTBESTOS BRAKE LINING

The American Asbestos Co., 1209 Stamford Street, Norristown, Pa., is advertising a brake lining made of asbestos, laying emphasis on the quality of asbestos used, the care taken in the manufacture of the yarn and weaving of the fabric, and in the final treatment given the fabric to make it resistant to oils, grit and other injurious substances.

Enamored steel signs, illustrating and advertising Testbestos brake lining, are supplied by the manufacturers and a pressed steel display stand, enamored in colors and with a capacity for 500 ft. of brake lining, is given with an initial order for a stock supply of Testbestos. This order must call for 500 ft. with not less than 50 of any one size, and a total investment of \$191.50. The lining is sold in different sizes at prices ranging from 75 cents to \$4.80 a ft. according to the size.

C. R. WILSON BODY CO., Detroit, Mich., has purchased a 43-acre tract of ground in Bay City, Mich., and will at once erect a modern body plant to be used at the outset for the manufacture of wood stock only. When completed the floor space will have been increased by 150,000 to 160,000 sq. ft. This addition promises to increase the production considerably and give a capacity of from 800 to 900 automobile bodies per day.

DURKEE-ATWOOD CO., Minneapolis, Minn., announces that a change in the name of its Rie Nie German Radiator Compound will shortly be made so as to eliminate the word "German." This company is a strictly American concern and the sale of the compound does not directly or indirectly benefit the enemy of the United States.



Full-Metal Panel Delivery Body No. 121

This body is a regular style with double glass doors. The price is \$115, best grade, attached to the chassis, in Los Angeles.



The New Nash One-Ton Truck

ONE of the developments in the truck field during the past few weeks is the announcement of the new Nash one-ton truck by the Nash Motors Co., Kenosha, Wis. This Nash one-ton truck is the first unit to be announced which will go to complete a full line of Nash trucks. Coming as it does as the first product of this organization to bear the Nash name, its appearance has excited interest among truck dealers and purchasers.

Practically a year has elapsed since the formation of the Nash Motors Co., headed by C. W. Nash, and the purchase by that company of the Jeffery factory at Kenosha. That the engineering department at the Nash factory has not been idle during the past ten months is evidenced by the appearance of this attractive one-ton unit which promises to be one of the leaders of its field.

one-ton field. The result is this new Nash one-ton truck.

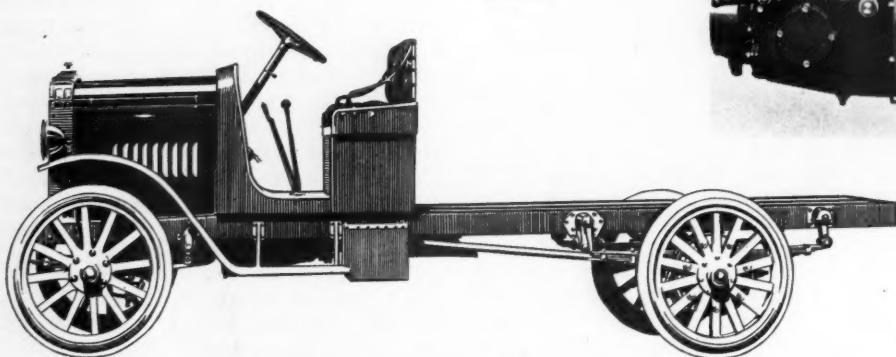
It was decided that this truck must be suited to every possible one-ton trucking need. Arrangements were made for a load capacity that would handle bulky cargoes efficiently. A generously long wheelbase, 130 in., was specified.

The engine is sufficiently powered to handle a capacity load under the extremes of bad operating conditions.

The transmission is sturdily constructed and built in unit with the engine. An internal gear drive axle system is used which gives high efficiency at low engine speed.

And in addition the truck is mechanically simple. It is light in weight, yet sufficiently strong to stand up under abnormal stresses if necessary.

Fine materials are used and strength is not sacrificed for lightness.



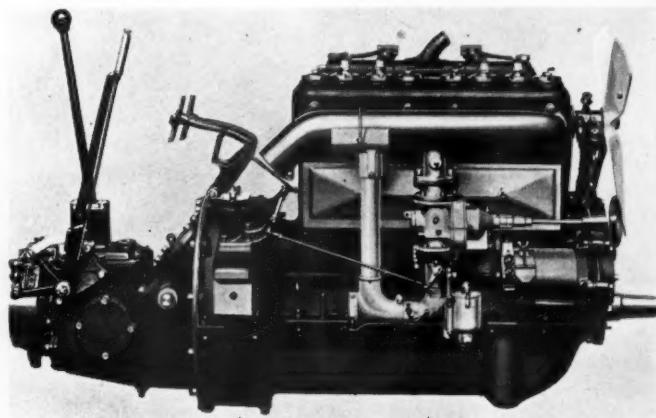
Side View of the New Nash One-Ton Chassis

Has 130 in. wheelbase, cast-tank type radiator with removable tubular core, L-head 3 3/4 x 5 1/4 in. engine, Delco ignition and Bijur starting and lighting system

The Nash factory, which was one of the most complete pleasure car and truck plants in the country at the time it was taken over by the Nash Motors Co., has been amplified and improved. A new foundry has been completed and a modern, four-story body plant added. Over \$300,000 worth of new machinery has been installed.

In producing the new Nash one-ton truck its sponsors have struck at the point which they believe will have the greatest demand.

With one idea in mind, to build a high grade light duty truck, Nash engineers devoted ten months to the study of delivery problems and the designing, testing and completion of a truck best suited to the



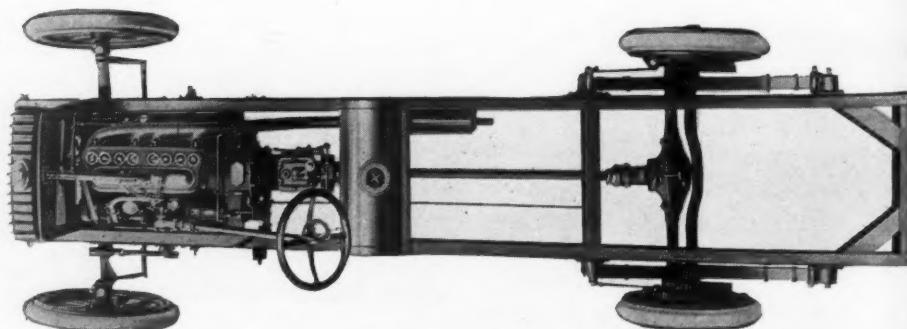
Power Plant of the New Nash One-Tonner

Valves are all on one side. An unusually large diameter crankshaft is employed.

The radiator is of the cast tank type with removable tubular core.

A front axle, especially designed for this truck, is employed, which is of the "I"-beam drop-forged type. It is made of alloy steel.

The L-head type of engine is used in the Nash one-ton truck. It is 3 3/4 x 5 1/4 in. and has an unusually large crankshaft 2 in. diameter, suspended from three large bearings.



Plan View of the Nash One-Ton Truck

Note the clean-cut, sturdy construction, absence of torque arms and radius rods, due to the Hotchkiss type of drive through the springs

It is built in unit with a truck transmission of the three speed selective sliding gear type.

Ignition is Delco, of the latest and most improved type.

The starting and lighting system is Bi-jur, operated with the Bendix drive.

The simplex type governor automatically shuts off a further supply of fuel after the truck has attained a speed of 20 m.p.h., and thus prevents overspeeding on the part of a careless driver.

The frame is of high quality steel, reinforced by heavy cross members and carried to the extreme rear end of the body. It is straight from end to end, tapering slightly at the front to provide the shortest possible turning radius. It is 5-in. channel $2\frac{1}{2}$ in. wide.

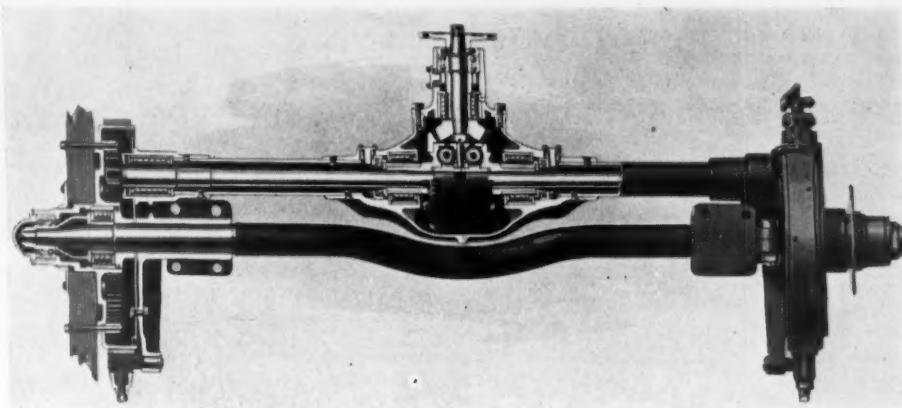
To transmit maximum power of the engine to the driving wheels the improved Celfor rear axle of the internal gear drive type is employed, embodying the M. and S. self-locking differential, which automatically prevents the spinning of any driving wheel that may lose traction. The axle is composed of two units. A solid drop-

forged dead axle beam carries the entire load, which relieves the driving unit of all weight.

Springs are designed to ride flat under maximum load. They so cushion the loads to make the truck very easy riding. It

naturally follows that such spring suspension also cushions the engine and this makes for economy of upkeep.

The price of the standard chassis, in lead, is \$1450 f.o.b. Kenosha. Bodies are furnished extra, from \$100 up.



Sectional View of Axle of One-Ton Nash
It is a Celfor Axle equipped with an M & S Self-Locking Differential

The 1917-1918 Line of Service Trucks Has Notable Change

SUMMARIZING the 1917-1918 line of Service trucks, produced by the Service Motor Truck Co., Wabash, Ind., the general improvements are:

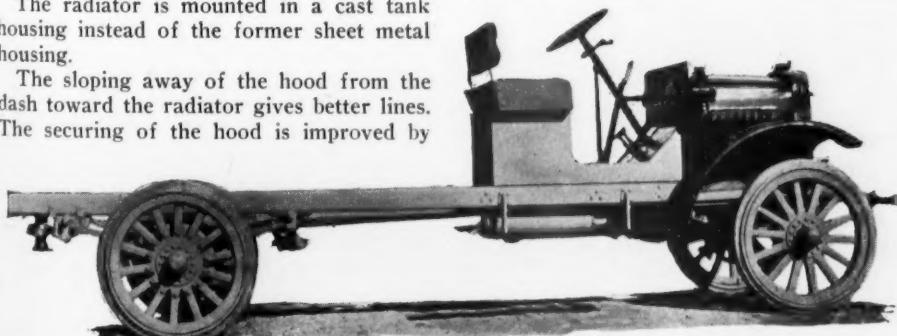
The adoption of the Simplex governor on all models except the one-ton. The adoption of the Master carburetor on all models except the 1-ton. The adoption of the Eisemann automatic spark advance magneto on models 275 and 300. The adoption of semi-floating Timken rear axle on model 220. The adoption of fore and aft steering on all models. Improvement in the clutch. Improvement in the control set. Improvement in the mounting of the hood. New type one-piece axle housing and improvement in spring suspension on models 230 and 240.

Production of this series, known as models 220, 230, 240, 270, 275 and 300, with the following changes and improvements, has been under way some time; deliveries were intended to start June 1, 1917.

Model 220

The radiator is mounted in a cast tank housing instead of the former sheet metal housing.

The sloping away of the hood from the dash toward the radiator gives better lines in this model. The securing of the hood is improved by bringing the hood down outside the filler strip instead of inside. The metal filler strip fastens direct to the top of the frame.



The Service One-Ton Truck, Model 220

Among the changes over the corresponding last year's model are: longer and heavier gearshift and emergency brake levers, and the adoption of the Eisemann magneto.

All phases of the truck industry covered best in the CCJ

bringing the hood down outside the filler strip instead of inside. The metal filler strip fastens direct to the top of the frame. In the center of the cast tank housing the script word "Service" is cast. The gear shift emergency brake levers have been made longer and slightly heavier to facilitate easy control.

The magneto now used is the Eisemann waterproof G S-4.

With the adoption of the Timken one-piece pressed steel housing, semi-floating type axle in this 1-ton truck, a more rugged and durable axle than formerly used is provided. The new shafts are larger and of better design than the old shafts.

Model 230

The sloping away of the hood from the dash toward the radiator gives better lines in this model. The securing of the hood is improved by bringing the hood down outside the filler strip instead of inside. The metal filler strip fastens direct to the top of the frame.

Through recent development by the Ross Gear & Tool Co. a very efficient fore and aft type is now manufactured, which has been adopted in place of the cross steer, this improving the durability of the steering parts.

In this model a new engine, superior to the former one, is used. This engine has a bore of 4 in. and a stroke of $5\frac{1}{2}$ in. The crankshaft has a diameter of $2\frac{1}{8}$ in. varying from 2 in. at the main bearing to $2\frac{3}{8}$ in. at the rear bearing. The engine is also simplified, having only three gears in the front end, while the old one had five.

The new engine has a pressure feed oiling system carrying pressure to all main bearings, connecting-rod bearings, wrist pins and camshaft bearings, under about 40 lb. pressure. The system is provided with an overflow valve which relieves the pressure at 40 lb., the surplus going out through the timing gears and the oil thrown off being returned to the oil sump for reduction.

This new engine is also fitted with a Simplex centrifugal grid valve governor, which limits the truck speed to 14 m.p.h. The governor is driven from the oil pump driving shaft and has all working parts enclosed.

The model 230, as well as all of the larger models in the new series, is now equipped with the Master carburetor.

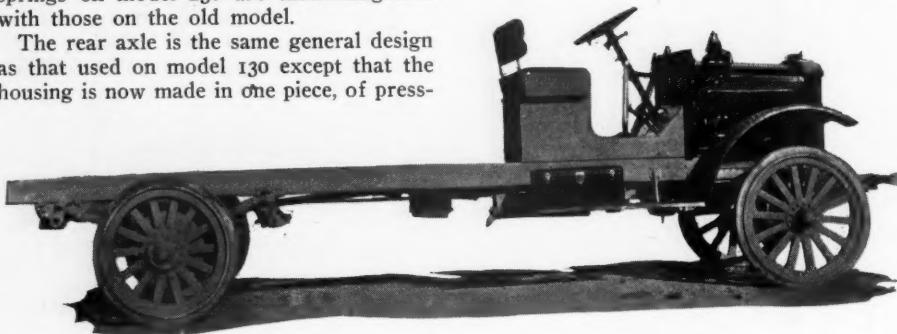
The clutch has been improved in that there is no bearing in operation except when the clutch pedal is held down. Thus, in normal running, there are no working parts which insures longer life in case the operator fails to give the clutch the attention it should have.

The hand control set has been considerably simplified and improved with a single-

piece construction. This decreases the weight of this unit and eliminates all superfluous parts.

The springs have been redesigned and are now considerably lighter and much more flexible than those formerly used. This improvement has been provided without reducing the carrying capacity. The springs on model 230 are interchangeable with those on the old model.

The rear axle is the same general design as that used on model 130 except that the housing is now made in one piece, of press-



Side View of the Service Chassis, Model 240

This model has a $4\frac{1}{4} \times 5\frac{1}{2}$ in. engine, and the crankshaft has a diameter of $2\frac{1}{8}$ in., varying from 2 in. at the main bearing to $2\frac{3}{8}$ in. at the rear main bearing

ed steel, instead of being built up of three pieces of cast steel.

The new axles have larger brake drums with shoes of wider face. The brake action has been materially improved.

Model 240

This model has an engine size of $4\frac{1}{4} \times 5\frac{1}{2}$ in., taking the place of the former $4\frac{1}{8} \times 5\frac{1}{2}$ in.

The crankshaft has a diameter of $2\frac{1}{8}$ in., varying from 2 in. at the main bearing to $2\frac{3}{8}$ in. at the rear main bearing.

The engine has also been very much simplified, having only three gears in the front end, while the old one had five. Oiling, governor, carburetor, clutch, springs and axles are comparatively identical with model 230.

Model 270

In this model the same engine is used as in model 240, the same improvements, as outlined, applying in this case. The old engine was the same size, bore and stroke, but the new one will have a considerably higher power output due to the more rigid crankshaft and better oiling system. The steering is fore and aft with its advantages, as pointed out.

The same clutch, newly designed and greatly improved, is used, as on models 230 and 240; the control set has been simplified and other minor changes made along the same general line as applies to the models 230 and 240.

Model 275

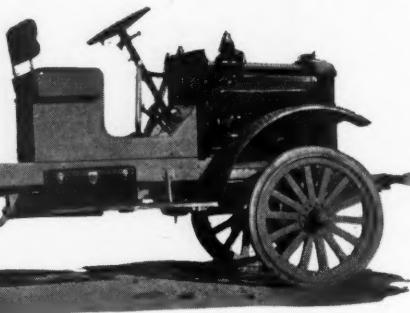
The same axles are used in this model as in model 270, and are interchangeable except for gear ratio. The chief improvements in this model are the use of the Master carburetor and the fitting of the governor.

The Eisemann automatic spark advance magneto is used in place of the hand control magneto.

The clutch, control set and steering have also been altered and improved on this job, along the same lines as pointed out in connection with model 230.

Model 300

Very few changes have been effected in this model. The steering has been changed from cross type to fore and aft, providing easier steering. The Simplex governor has been added and a Master carburetor is now supplied. The rear axle also has been lowered from 11 2-3 standard to $10\frac{1}{4} : 1$.



Side View of the New Kissel Model, the Flyer

standard, providing slightly more speed with practically the same power as formerly.

Prices for the various size trucks are \$1500, \$2300, \$2500, \$3300, \$3600 and \$4300 respectively.

NEW KISSEL TRUCK MODELS

Longer wheelbase and loading space and the all-year cab are the outstanding features of the new line of Kissel trucks announced by the Kissel Motor Car Co., Hartford, Wis.

In the place of the old terms, such as "Tonner," "Two Tonner," etc., new descriptive names are given to each of the new models—names that give the purchaser a good idea of the capacity of, and to a certain extent, the uses for which, the trucks are built.

Hence the new model that was formerly termed the "Three-Quarter Tonner" or "light delivery car," is now known as "The Flyer," with an increased wheelbase from 120 in. to 135 in., and with 8 ft. loading space instead of 6 ft. 3 in. The chassis capacity of "The Flyer," including body, is 2250 lb. Price, \$1085.

The next sized model is "The General Utility," with an increased wheelbase of 152 in. instead of 132 in., and a loading space of 10 ft. instead of 8 ft. The chassis capacity, including body, is 3400 lb. Price, \$1485.

"The Freighter," with a chassis capacity, including body, of 5200 lb., is third in size with a 168-in. wheelbase instead of 144 in., and with a 12-ft. loading space in place of 10 ft. The rear tires are 7 in. instead of 6 in., while the front tires are 4 in. instead of $3\frac{1}{2}$ in. Price, \$2100.

The two largest size models are the "Heavy Duty," \$2950, with a chassis capacity, including body, of 8600 lb., 168-in. wheelbase and a 13-ft. loading space, and "The Dreadnaught," \$3750, of 11,800 lb. capacity, including body, 180 in. wheelbase and 14 ft. loading space. Both of these big trucks are built for heavy work and are particularly adaptable for use among contractors, excavators and road builders, as well as manufacturers of iron, steel, and in the metal working industries.

All five models have the Kissel-built engine—"The Flyer" and "General Utility" with a bore and stroke of $3\frac{1}{8} \times 5\frac{1}{2}$ in., giving 24.2 h.p., S. A. E. rating, while that of the three large sizes is $4\frac{1}{4} \times 5\frac{1}{2}$ in., giving 29 h.p.

"The Flyer" has a special bevel gear drive, while the other four models are equipped with worm drive.

Unusually light weight for their carrying capacity characterize the "Heavy Duty" and "Dreadnaught," the chassis weight of the former being 7000 lb. and the latter 7600 lb.

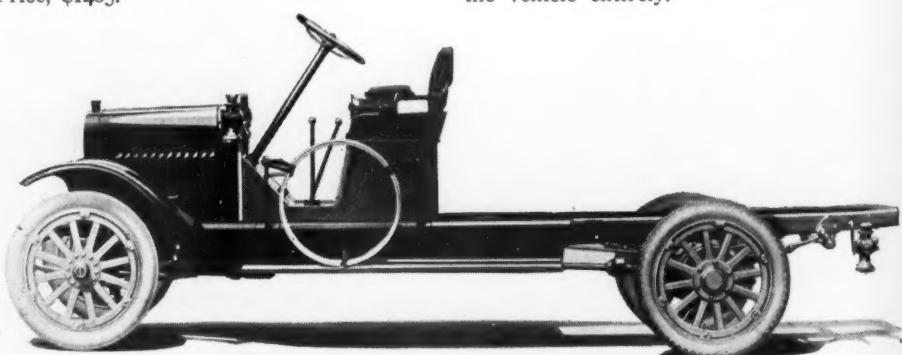
VELIE OFFERS A UTILITY CAR

Those who have country estates, as well as those whose automobile must necessarily serve many purposes, will be interested in the new Utility car announced by the Velie Motors Corp.

The Velie Utility car is built on the well-known Velie Six chassis and therefore has in its make-up all the features of Velie construction—improved engine, Timken axles, push button starter, etc.

The body is claimed to be entirely different from any motor type yet produced. It has the grace and finish of a pleasure model, but the carrying capacity of a light errand car. The rear of the body forms a large open space for all manner of packages, but may be converted into passenger use by means of removable seats.

The front seats are divided, allowing entrance to the spacious rear compartment, while a rear drop gate, cleverly fitted, permits ready handling of whatever burdens are to be transported. A permanent canopy top with snug-fitting roll curtains protects the vehicle entirely.



Side View of the New Kissel Model, the Flyer

Has wheelbase of 135 in., 8 ft. loading space, and a chassis capacity, including body, of 2250 lbs. The price is \$1085.

CHILTON TRACTOR JOURNAL

TRACTOR MANUFACTURERS WILL BUILD ONE-HUNDRED THOU- SAND TRACTORS NEXT YEAR

Tangible Demand for Tractors so Far Exceeds the Supply, That It is Really Pitiable. World's Food Supply Hinges on the Tractor

THE present inability of farmers to raise more grain is due to lack of sufficient farm power and the scarcity of farm labor. For farm power the farmers are dependent upon either horses and mules or tractors. The animal power on the farms will of necessity decrease, owing to the demand of the army for horses and mules, and if the farmer should start now to raise horses in the hope of increasing the supply it would be four years before they would be available for farm work.

This condition indicates clearly the necessity of the intelligent use of farm tractors on a large scale. The tractor does not tire as a horse does, is not affected by the heat and can be operated twenty-four hours a day if necessary. Many tractors are operated inefficiently now because the farmers owning them do not understand them sufficiently well to get the best results.

At the present time, according to accurate statistics collected by the Bureau of Farm Management of the Department of Agriculture, there are available in the different States of the Union approximately 35,000 tractors. But the actual number that were vitally needed this spring is twice that amount. Had 70,000 tractors and the necessary implements been available this spring the greatest crops in the

history of our country could have been assured.

The actual demand for tractors is simply astonishing. Most any tractor dealer or supply house can show letter after letter from farmers, which indicate that these farmers will be unable to cultivate their land this year until they get tractors.

A comprehensive estimate of the number of tractors to be made next year places the figure at approximately 80,000, in addition to which must be added about 30,000 units for converting pleasure cars into tractors. This estimate is the result of a careful personal survey of the tractor industries, made by the manager of the Chilton Tractor Departments. This estimate is based on the total number of machines to be made by 66 tractor makers and 8 unit makers. And these figures are not the total of the makers' original figures, which have been heavily discounted in many cases. Therefore this estimate is about as correct as can be obtained.

Every manufacturer who has no plant and who does not realize the mechanical difficulties in speeding production, claims that next year he is going to make a whole thousand or two himself. Of course, in most cases these so-called "claimed" figures must be heavily discounted.

The opportunity is now here for the man who has the equipment and the materials with which to make tractors to get into the business on a basis and in a volume that will mean much to him after the war is over. This is based on the two simple facts—of a proven demand and a failure of the present manufacturers to supply that demand.

NATIONAL TRACTOR FARMING DEMONSTRATION AUGUST FOURTH TO TENTH

THE National Demonstration of farm tractors to be held at Fremont, Neb., August 6th to 10th, will undoubtedly be the greatest event of its kind ever held in this country. The Fremont demonstration will be the only show to be held this year. According to A. E. Hildebrand, manager, this year's affair will see more than double the number of machines operating on the field daily, than there was at any show last year, due to the fact that every manufacturer is going to take every size and type of machine with him to demonstrate to the prospective purchaser who will come from every section of the country.

Arrangements have already been made for more than 3000 acres of land within a radius of three miles of the headquarters. If necessary, the management will add several thousand acres in addition to this, in order to conform with the rules governing this year's demonstration, which stipulate that each day sufficient land shall be in shape to plow from 3 to 7 hours. This will necessitate the use of a large number of acres for plowing alone, because much land will be needed for the machines that will be on the field discing, harrowing, seeding, operating manure spreaders and other types of drawbar machinery.

According to present indications, the attendance will exceed 350,000 dealers and farmers, and with exceptionally good weather the attendance should reach more than the half million mark, which is approximately the same number that attended the eight demonstrations held on the circuit last year.

List of Manufacturers Who Will Exhibit at 1917 Tractor Demonstration

Allis-Chalmers Co., Milwaukee, Wis.
Advance-Rumley Co., LaPorte, Ind.
Albaugh-Dover Mfg. Co., Chicago, Ill.
Albert Lea Tractor Co., Albert Lea, Minn.
Aultman-Taylor Co., Mansfield, O.
Avery Co., Peoria, Ill.
Avery & Sons, B. F., Louisville, Ky.
Big 4 Drive Co., Big Rapids, Mich.
C. L. Best Gas Traction Co., San Leandro, Cal.
Bull Tractor Co., Minneapolis, Minn.
Bullock Tractor Co., Chicago, Ill.
Case Plow Wks., J. I., Racine, Wis.
Case T. M. Co., J. I., Racine, Wis.
Cleveland Motor Plow Co., Cleveland, O.
C. O. D. Tractor Co., Minneapolis, Minn.
Collins Plow Co., Quincy, Ill.
Dauch Mfg. Co., Moline, Ill.
Deere & Co., Moline, Ill.
Dunham Co., Berea, O.
Electric Wheel Co., Quincy, Ill.
Elgin Tractor Corporation, Elgin, Ill.
Emperson-Brantingham Imp. Co., Rockford, Ill.
Gile Tractor & Engine Co., Ludington, Mich.
Grand DeTour Plow Co., Dixon, Ill.
Gray Tractor Co., Minneapolis, Minn.
Hart Parr Co., Charles City, Ia.

Hoke Tractor Co., South Bend, Ind.
Holt Mfg. Co., Peoria, Ill.
Huber Mfg. Co., Marion, O.
International Harvester Co., Chicago, Ill.
Inter State Engine & Tractor Co., Waterloo, Ia.
Janesville Mach. Co., Janesville, Wis.
Joliet Oil Tractor Co., Joliet, Ill.
Kinnard Haines Co., Minneapolis, Minn.
Kardell Tractor & Truck Co., St. Louis, Mo.
Lauson Mfg. Co., The New Holstein, Wis.
LaCrosse Plow Co., LaCrosse, Wis.
LaCrosse Tractor Co., LaCrosse, Wis.
Minneapolis Steel & Machinery Co., Minneapolis, Minn.
Moline Plow Co., Moline, Ill.
Nilson Farm Tractor Co., Minneapolis, Minn.
Lyons Atlas Co., Indianapolis, Ind.
Oliver Chilled Plow Co., South Bend, Ind.
Parlin & Orendorff Co., Canton, Ill.
Parrett Tractor Co., Chicago, Ill.
Peoria Tractor Co., Peoria, Ill.
Pioneer Tractor Co., Winona, Minn.
Rock Island Plow Co., Rock Island, Ill.
Roderick Lean Co., Mansfield, O.
Russell & Co., Masillon, O.
Sanders Plow Co., Newell, Chattanooga, Tenn.

Simplex Tractor Co., Minneapolis, Minn.
Velle Motors Corp., Moline, Ill.
Vulcan Plow Co., Evansville, Ind.
Wallis Tractor Co., Racine, Wis.
Waterloo Gas Engine Co., Waterloo, Ia.

Accessory and Parts Exhibitors

Waukesha Motor Co., Waukesha, Wis.
Sumter Electric Co., Chicago, Ill.
Hyatt Roller Bearing Co., Chicago, Ill.
Buda Motor Co., Harvey, Ill.
Champion Spark Plug Co., Toledo, O.
Balco Oil Co., Toledo, O.
Climax Engineering Co., Clinton, Ia.
Vacuum Oil Co., New York.
Timken Roller Bearing Co., Canton, O.
K. W. Ignition Co., Cleveland, O.
Maltby Auto Specialty Co., Detroit, Mich.
Standard Oil Co., Omaha, Neb.
Byrne Kingston Co., Kokomo, Ind.
Pierce Governor Co., Anderson, Ind.
Eisemann Magneto Co., New York.
Holly Bros. Co., Detroit, Mich.
Erd Motor Co., Saginaw, Mich.
Diamond Chain Co., Indianapolis, Ind.
Doman Motor Co., Oshkosh, Wis.
Keystone Lubricating Co., Philadelphia, Pa.

CAREFULLY KEPT RECORDS PROVE SAVING WITH TRACTORS

Tractor operations on a large scale are being conducted at one of interior California's famous ranches—the Tagus ranch in Tulare county—located about four miles from the thriving town of Tulare. This ranch, which has long been known as one of the foremost stock ranches in the West, specializing in high-bred horses, cattle and hogs, contains about 9000 acres. Modern scientific methods of farm management are closely observed, with special regard for efficiency in all departments. Records are carefully kept, showing all productive costs, together with the gross and net results. Every animal on the ranch and every acre of land goes into the record.

Under the direction of the owner, H. C. Merritt, statistics have been compiled showing at a glance comparative figures for different seasons and the various products. It was the excessive cost of animal power that first directed Mr. Merritt's attention to the tractor as essential mechanical farm equipment. His records showed clearly that the cost per acre for plowing, cultivating and the ordinary farm routine work, combined with horse feed, stabling, labor charge, etc., was steadily growing and the daily production was not advancing.

Last December Mr. Merritt purchased a model E 15-35 Sandusky tractor through William Rabb, Los Angeles representative for the Dauch Manufacturing Co., of Sandusky, Ohio. This tractor was placed in commission and again the daily statistical cost record was employed, with the result that in February, 1917, four more model E Sanduskys were ordered. Careful demonstration convinced Mr. Merritt that this type of machine would answer his purpose best.

At the Tagus ranch the tractors are equipped with regular electric light dynamos. The operation shown in the accompanying illustration is an 1800-acre plant to be planted in Tepary beans. The tractors are each pulling three 14-in. bottoms, set 10 in. deep. Automatic power lifts are available for raising plow, making the machines to all intents and purposes "oneman tractors." This 1800-acre bean field, or seedbed, will be worked down completely by the tractors. Horses will be used only to pull the bean planters. Before the five Sanduskys were put to work in the bean field they were used on a 700-acre alfalfa

tract and also on a sugar beet field of 2000 acres. General utility of the tractor is indicated in the fact that when plowing is done they are used to pump water to irrigate the beans and other crops. On the ranch there are a series of wells; the tractors are moved from one to another as occasion demands.

At the time the picture shown herewith was taken the five tractors were being operated day and night in eight-hour shifts, giving the daily equivalent of the output of 125 head of horses or mules. All repairs are readily made at the ranch by an experienced tractor mechanic, who makes convenient use of a portable machine shop. Separate operating costs are kept with each tractor for each day's work, showing labor charge, fuel and oil consumption, upkeep, miles traveled and acres plowed, harrowed or cultivated. A similar cost system was in use at the ranch when animals furnished the "power" for farm work, including stabling, feed, labor, record of hours of service, etc., so that accurate comparisons between the two methods—animal and mechanical power—are at all times available.

DEMONSTRATES DEPENDABILITY OF TRACTOR IN SEVENTY-TWO HOUR TEST

The Parrett Tractor Co., of Chicago, recently made a test with a Parrett Tractor that should convince the farmer that the tractor had reached the stage where it was dependable. The test was conducted on the farm of U. G. Stewart, Paris, Ill. The engine was locked and the keys locked in the bank vault, to guarantee that no false results could be obtained. The actual test consisted of running 72 hours and in this time 48 acres of alfalfa were plowed and 32 acres were double disced. The machine used 2½ gallons of fuel per acre on the alfalfa land and 1¾ gallons on the stubble land; ½ gallon of lubricating oil was used every twelve hours. The actual length of time that the engine ran was 81 hours, although the actual test time, as officially given, was 72 hours.

After the test the engine was carefully examined and found to be in perfect condition. It is believed that this record has not been equalled in this country.



Listed 175 Acres of Corn in Five Days

This lister is the first power-lift, two-row lister ever put in the state of Kansas by the Parlin & Orendorff Company, of Canton, Ill. When the wheat did not come up on the Rathbun farm, in Downs, Kan., on account of the drought, it was decided to plant corn. The 175 acres were listed in five days, running twenty-two hours per day, in three shifts. Farm boys, and not experts, did the job, and best of all, they didn't have a wrench on the machine from the time they started until they stopped.



Sandusky Tractors on the Tagus Ranch

These are the Model E, 15-35 Sandusky tractors at work on eighteen hundred acres, to be planted in Tepary beans. Each one is pulling three 14 in. bottoms, set 10 in. deep. Automatic power lifts are available for raising the plows.

The Heider Tractor, a Machine for Every Power Service

NINE years ago the Rock Island Plow Co., of Rock Island, Ill., placed its first machine in the field. It was of the four-cylinder, four-wheel type, and was fitted with the Heider friction transmission. Aside from the usual minor changes that necessarily are made from time to time, the principle of construction has never been changed. Within that time the Heider friction transmission has not only proved its practicability, but has become widely known as one of the biggest features of the Heider's success.

The maker states that with this transmission the delivery of power to the driving wheels is simplified, while at the same time a steady and flexible power is transmitted to the drive wheel. As a result heavier loads can be pulled with less lug equipment on the driving wheels. This is due to the fact that the power is delivered with the same steady, continuous pull, as would be the case were the tractor equipped with an electric motor.

One of the troubles arising from the use of friction transmissions is the wearing of flat surfaces on the friction faced discs. In the Heider transmission this dif-

ficulty is effectively overcome by lining the driving member with fibre and not the disc. In starting the load the metal disc, standing still, is brought in contact with the revolving fibre. With this arrangement it is impossible to wear any flat places on the fibre wheel.

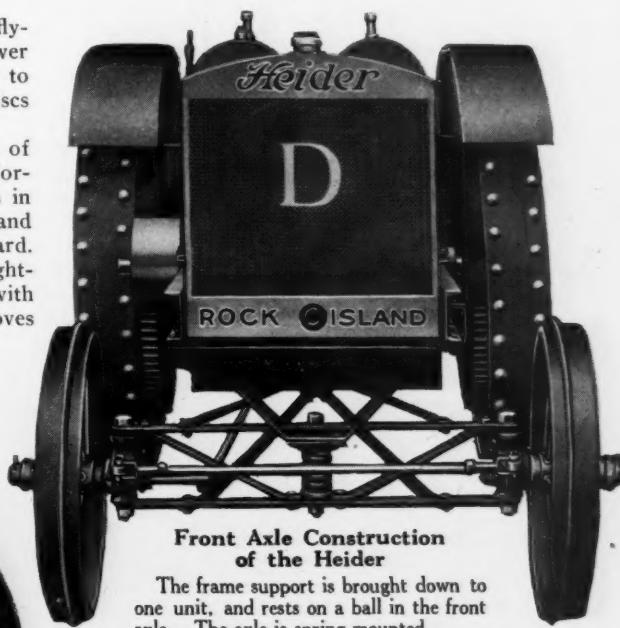
All heavy work is done on the outside diameter of the large metal discs, giving the greatest leverage when most needed for heavy loads.

The fibre is attached to the flywheel of the engine, and power is transmitted from this fibre to either one of the large metal discs on the belt wheel shaft.

When the lever at the right of the steering wheel is shoved forward the left-hand disc comes in contact with the fibre wheel and the tractor is driven forward. When it is pulled back the right-hand disc comes in contact with the fibre and the tractor moves

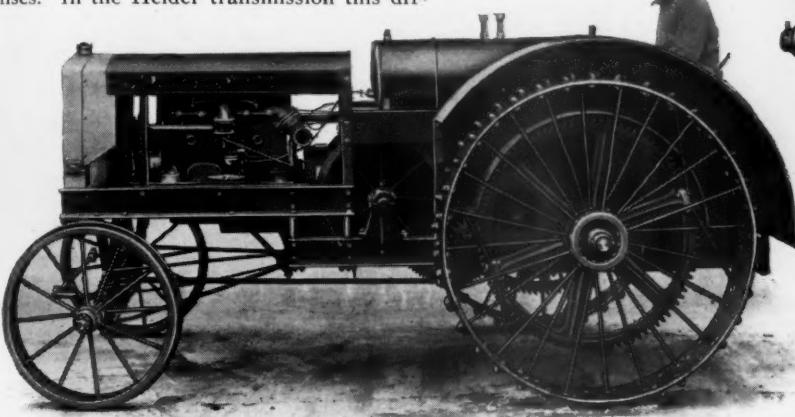
backward. Neither disc touches the fiber wheel when the lever is in the center and the tractor stands still. The belt or drive pulley is controlled in exactly the same way.

The speed change lever has seven notches, each notch representing a different speed. Any desired speed can be had while the tractor is pulling a load, by simply pulling the lever.



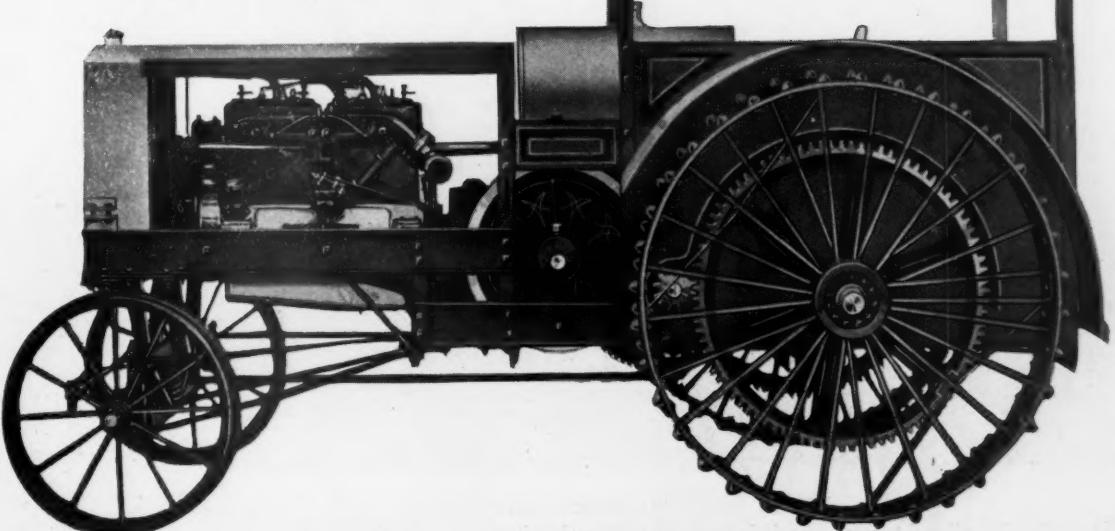
**Front Axle Construction
of the Heider**

The frame support is brought down to one unit, and rests on a ball in the front axle. The axle is spring mounted.



**The Heider Model D
9-16 h.p.**

This model, as well as its big brother, the 12-20, is fitted with the Heider special friction transmission.



**Side View of the
Heider Model C, 12-20**

Speed of this machine is from 1 to 4 m.p.h., with a belt speed of 100 to 800 r.p.m. Its width is 6 ft. 2 in., and length 12 ft.

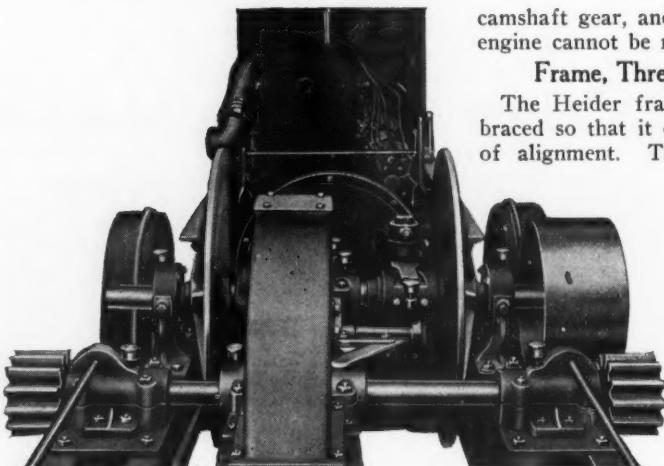
No brakes are necessary with the Heider transmission. In driving down a grade with a load the operator has absolute control of the machine. The transmission can be thrown from high speed into reverse instantly, if necessary, without the slightest injury to any part of the machine.

The Heider is built in two sizes—Model C, 12-20 h.p., and Model D, 9-16 h.p. With a few exceptions the general appearance and construction of the two sizes are identical. Waukesha engine, Dixie high-tension magneto ignition, Kingston improved type carburetor, are standard equipment on both models. Model C is recommended for three 14-in. plows under average conditions.

Burns Kerosene or Gasoline

A specially designed manifold permits the use of either gasoline or kerosene. The change from one kind of fuel to the other can be made without changing carburetors. There are two fuel tanks connected with a two-way valve, so that either fuel can be turned on from the cab. One tank has a compartment for holding water, which is fed with the kerosene when using that fuel.

A feature worthy of mention is the accessibility to the fuel tanks, levers, etc. These are all within handy reach. The



fuel tanks are filled from the cab. All implements can be attached to the tractor by one man.

The engine is governor-controlled, the governor being entirely enclosed. It is controlled from the

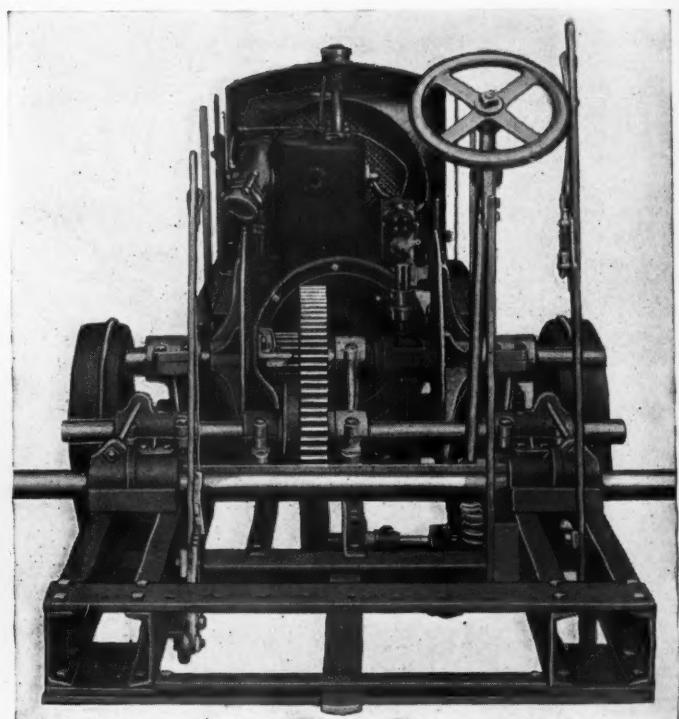
camshaft gear, and is adjusted so that the engine cannot be raced.

Frame, Three-Point Suspension

The Heider frame is braced and cross-braced so that it cannot twist and get out of alignment. The frame is three-point suspended two at the rear wheels and the

Showing the Heider Friction Transmission on the Heider 9-16

This friction transmission permits of seven speeds forward and seven reverse. Speed changes can be made while the tractor is in motion.



Not a Regular Job for a Tractor

Just one of the multitudinous duties to which a tractor can be assigned when not engaged in strictly farming occupations



A Model C 12-20 Heider Tractor in Action

The Heider has adhered to standard principles of construction since it was first designed, nine years ago

Driving Compartment of the Heider 12-20

Accessibility to all levers and fuel tanks is a feature. Coupling to any kind of load can be made by one man

other on the ball in the front axle. The frame is swung beneath the rear axle, bringing the tractor close to the ground. This feature and the removable top makes the machine ideal for orchard cultivation.

The large, heavy spur gears and steel driving pinions are oiled from the inside of the cab. A small supply tank is attached on the inside of each fender. The tanks have a valve which can be opened by the operator in the cab whenever these parts require lubrication.

Ball bearings are used in all principal bearings, with self-aligning cages, a form of bearing which eliminates any possibility of heating, regardless of the length, weight or tightness of the belt.

Brief specifications of the Model C, 12-20, are as follows: Engine, 4-cylinder; 4½-in. bore, 6¾-in. stroke; wheelbase, 96 in.; rear wheels, 57 in. in diameter; width, 10 in.; front wheels, 30 in. in diameter; width, 5 in.; fuel capacity, 21 gal.; water

capacity, 7 gal.; weight, 6000 lb.; tractor speed, 1 to 4 m.p.h.; belt speed, 100 to 800 r.p.m.

Specifications of Model D, 9-16, are: Weight, 4000 lb.; 4-cylinder, 4½-in. bore by 5¾-in. stroke engine; wheelbase, 87 in.; rear wheels, 54 in. in diameter, 8 in. wide; front wheels, 30 in. in diameter, 4 in. wide; height, 5 ft. 2 in.; width, 5 ft. 8 in.; length, 10 ft. 8 in.

UNIT FOR CONVERTING FORD CAR INTO TRACTOR

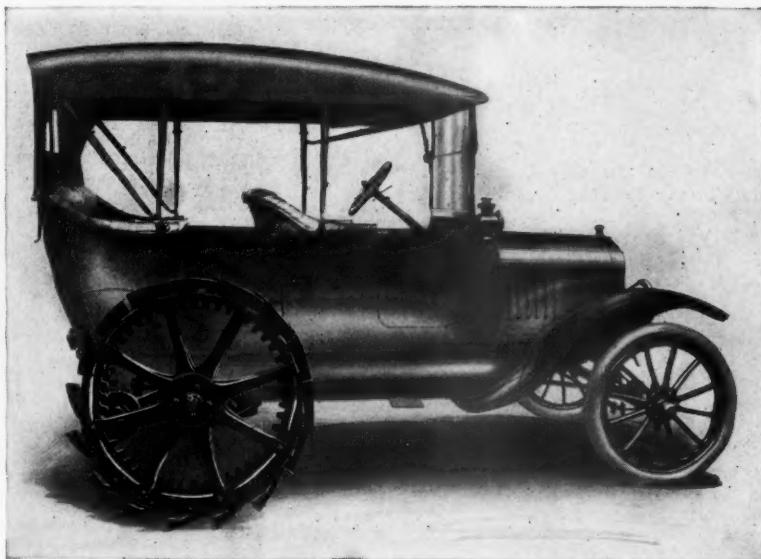
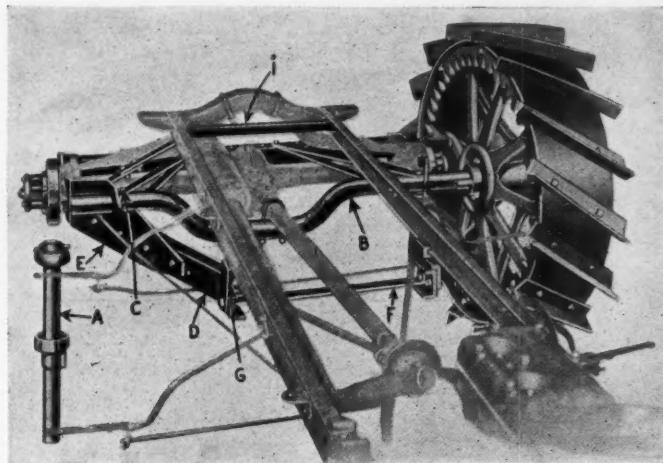
To replace the horse in farm work the Unitractor Co., 376 Cicero Avenue, Chicago, Ill., has devised a unit which converts the Ford car into a tractor. This unit makes available in one machine a pleasure vehicle and a practical tractor. It is built only for use on the Ford car. No holes are bored in the Ford frame or elsewhere. The side members, tubular steel axle and drawbar are attached and remain on the car permanently, weighing less than one hundred pounds. This superstructure does not project and with the exception of the draw-bar is invisible when the Ford wheels are replaced.

This simplifies replacement in case of breakage. Each section is a gray iron chilled casting with a rib reinforcement at the base of the segment. The segments are claimed to be self-cleaning, due to the design of the gear teeth.

The roller pinions are assembled with a cast iron roller carrier, containing five case hardened steel rollers running on case

hardened roller pins. The quick convertibility of the Unitractor from automobile to tractor lies in the axle. The bull wheels of the Unitractor run on a 1 13-16-in. solid cold rolled steel axle, *a*, which fits and is rigidly keyed and bolted into a tubular steel permanent axle, *b*. By removing one bolt, *c*, the solid axle and wheel are quickly removable.

The Different Parts of the Tractor Unit and Their Positions When Installed



Appearance of the Tractor Unit When Applied and Ready for Operation

When used as a tractor each Ford rear wheel is replaced with a pinion carrier equipped with a brake drum and with five hardened steel roller pinions.

The Unitractor wheels have 2-in. angle iron lugs, shaped to the curve of the wheel, which shaping is claimed to eliminate rough riding on hard surfaces. Each wheel carries an internal gear of chilled gray iron made in eight segments. The gear reduction effected is eight to one, hence, at an engine speed corresponding to 20 m.p.h. of the Ford car the Unitractor is working at the rate of 2½ m.p.h.

Construction

The Unitractor wheels are of steel except the cast iron hub. The spokes are of pressed steel construction, bolted and keyed to the rim. Each section of the gears of the Unitractor has six teeth and is interchangeable with any other section.

The drawbar is 2½ x 2½-in. angle steel extending across the entire width of the rear of the Ford. It is attached to the rear axle by the bolts which secure the solid axle to the tubular axle, and when these bolts are tightened the drawbar, tubular axle and solid axle pieces are a rigid unit. This drawbar is also adjustable for height, with a range of 3 in.

The main side member, *d*, is of 3-in. channel iron, reinforced by the steel plate *e* through which the permanent axle is fastened. The forward end of the frame is braced by a steel cross piece, *f*, and is coupled to the Ford frame by the frame block *g*. The rear frame crossbrace *i* does not necessitate the removal or changing of the Ford rear spring.

The Unitractor is converted back into an automobile by removing the bull wheels and pinions and the rear cross rod and frame blocks. If the distance to be covered is short the change may be effected by merely changing the wheels. The price of the Unitractor is \$175.



This Outfit is Plowing Land Free for Farmers in New Jersey

Two motor trucks, one loaded with farm implements and the other carrying a farm tractor, have been giving first aid in planting the spring crops of the New Jersey farmers. They are the offering of W. C. Durant, president of the General Motors Company, to the big campaign for bumper crops that the nation is making this year as an aid in its war with Germany. The farm equipment is free for the asking to every farmer along the route the trucks are traveling.

THE ADAPTABILITY OF THE DIXIE MAGNETO TO FARM TRACTOR IGNITION

The requirements of farm tractor ignition are such that a magneto of high efficiency is necessary to fire the low-grade fuel sometimes carbureted under incorrect conditions, and of sufficient capacity to permit starting without the necessity of carrying an auxiliary battery system.

The Dixie magneto as used by fifty tractor manufacturers, is, because of its patented construction, peculiarly adaptable to farm tractor ignition. The patented design and construction is such that all the electrical energy generated is liberated in a quick, almost instant, surge of energy. The platinum tipped contact points always separate to produce the spark exactly on the peak of this electrical wave, so that the spark, no matter what the position of the timing lever, always has the same maximum intensity.

In addition, the Dixie magneto is enclosed thoroughly with close-fitting dust, water and oil-proof covers, so that the tractor which stands out in the snow and rain and which is practically always working in clouds of dust, is free from ignition troubles. In the Dixie magneto the adjustment of the contact points can be quickly and easily made with a screw driver, and while the engine is running, if desired. The magneto is so simple that there are few parts and these can be quickly reached without any special tools. The stationary compound coil is mounted up in the arch of the magnets away from oil where it can be quickly reached by simply taking off the covers and turning the magnets to either side. The condenser is a patented mica construction accessibly located on top of the coil. There are no rotating windings, and of course, the rotating member being simply a peculiarly shaped mass of metal, need never be touched. The ro-

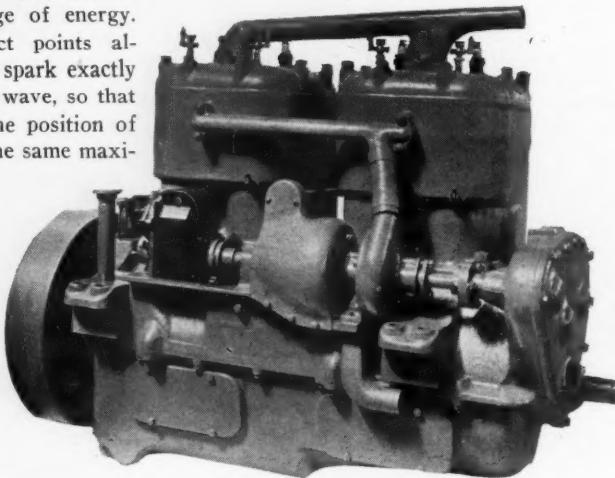
ating member runs on ball bearings of large size.

The secondary current of from 10,000 to 20,000 volts must be led without leakage to the distributor and there directed to the different cables. In the Dixie the current is taken from a segment on the side of

the stationary compound coil and led directly in a short, straight line, to the distributor segment. The high-tension circuit inside of the Dixie magneto is very short and adequate insulation to guard against any high-tension leakage can be provided.

The many features incorporated in the design of the Dixie magneto recommends it particularly for tractor ignition requirements.

No less successful in the tractor field has been the Sumter starter coupling. It eliminates the necessity for an auxiliary battery for starting large engines. Being a very simple, compact and small purely

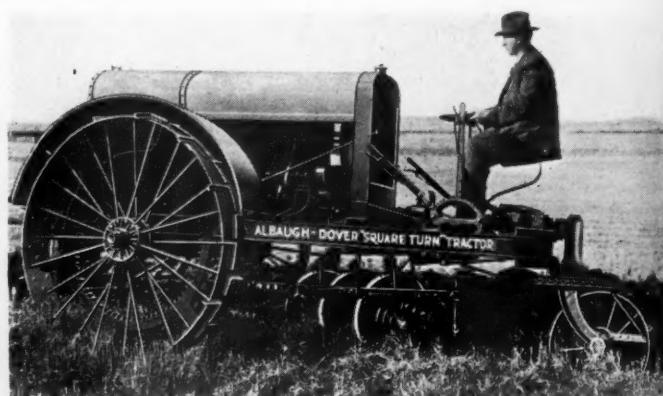
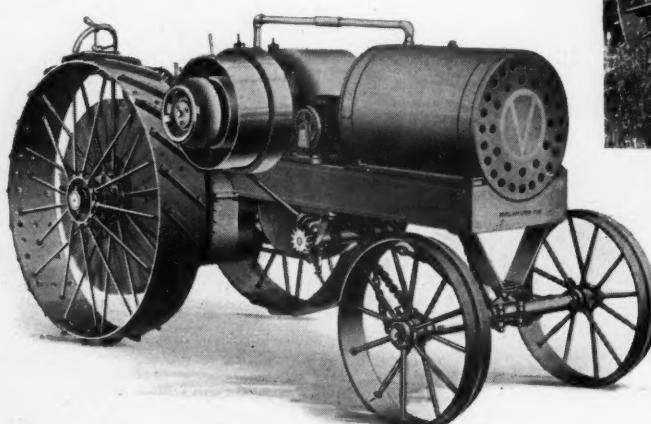


Dixie Magneto and Sumter Coupling on a Climax Tractor Engine

mechanical device, it requires no complicated wiring and no parts which deteriorate through ordinary usage. The action of the coupling is such that the rotating mem-

Two Well-Known Tractors Equipped With the Dixie Magneto

The upper one is the Albaugh - Dover "Square Turn", and the lower one the "Vail-Rentschler."



rapidly past the electricity-generating point. During this rapid movement the contact points separate and cause the spark. This spark has the same intensity as when the magneto is running at several hundred revolutions per minute and is independent of the actual speed at which the engine is being turned forward.

One tractor developing over 60 h.p. in 2 cylinders, 10-in. bore x 15-in. stroke, was equipped with a large belt-driven magneto in combination with two vibrating spark coils and a set of dry cells. This made a very complicated ignition system with a good many wires, 2 or 3 switches and a set of dry cells to buy and maintain and with all the possibilities for trouble which such complication permits. By the application of a Dixie magneto, combined with the Sumter starter coupling, all of this complicated wiring was eliminated. The ignition system for this large tractor now consists simply of a Dixie magneto, Sumter starter coupling and two high-tension cables leading from the magneto directly to the spark plugs. Obviously, an engine as large as this cannot be turned at great speed for starting, yet absolutely no trouble has been experienced with the ignition equipment just mentioned. This is just an example of how the application of Dixie ignition equipment to farm tractors eliminates complication and inefficiency.

EDMON BOSTER, Greensburg, Kans., has taken the agency for the Case line of tractors, threshing machines and repairs.

UNITED LINE SERVICE CORP., distributor of the United trucks and tractors, has moved to its new salesrooms and service station at 11th Ave. & 50th St., New York City.

DAUCH MFG. Co., Sandusky, O., manufacturer of the Sandusky tractor, will erect a service station building at Lewistown, Mont., which will contain 6,000 sq. ft. of floor space.

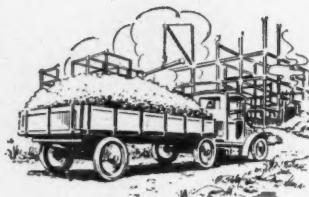
REMY BROS. TRACTOR CO. has been formed with a capitalization of \$500,000 to manufacture tractors. A plant at Kokomo, Ind., will be built and negotiations for a factory site are under way. Frank and Perry Remy, formerly of Anderson, where they established the Remy Magneto Co., are president and secretary-treasurer respectively. Elwood Haynes, president of the Haynes Automobile Co., and A. G. Seiberling, general manager of the Haynes concern, are stockholders.

Firestone Truck Tires

The Firestone Company first discovered and developed the value of grooves in Giant Tires. These grooves aid in traction and the distribution of weight. They prevent skidding and side-sway. They increase the natural resilience given the tire by the thickness and breadth of the tread and the fine rubber of which it is constructed. This is the tire for your trucks. Get the facts from the Firestone man. He has tires for all trucking needs.

FIRESTONE TIRE AND RUBBER
COMPANY, AKRON, OHIO

Branches and Dealers
Everywhere



TRAILER DEPARTMENT



Number of Trailers Increasing in the Northwest

By WARREN EUGENE CRANE

ONE year ago trailers were a rarity on the streets of Seattle and other cities of the Pacific Northwest. Today they are used in many different lines, such as the lumber, electrical, food product, laundry and automobile business with a marked degree of success. There are four potent reasons for their increasing popularity: First, they often double the loads which can be drawn by the motor truck; second, they operate at a cost that averages about 10 per cent. more than that of the commercial car alone; third, they prevent a congestion of freight at local freight houses and docks; fourth, they have proven a factor in time saving and greater efficiency in every line of business in which they have been placed in service.

The Crescent Mfg. Co., the largest firm of its kind in the Northwest, has been using one of their old horse delivery wagons as a trailer with satisfactory results. This firm has several large trucks which they use in delivering the Crescent brand of spices, extracts, coffees, teas, bluing, ammonia, pepper, salt, chili powder, paprika, curry powder, etc., to the various groceries, department stores, docks and freight depots of Seattle.

For a time the drivers of their trucks would go to the freight docks and find that the man who handled their freight was busy so they were forced to wait with their big

2-ton vehicles and often lose several hours each day. Finally the company conceived the idea of attaching the shortened tongue of their delivery wagon to the rear axle of their different trucks. They would pull this wagon to the depot, leave this home-made trailer to be loaded or unloaded while the

our G. M. C. truck and trailer, including the salary of the driver, insurance, gasoline, oil, grease, depreciation, tires, repairs and storage has been only \$150 per month. We have made as high as 25 to 30 trips a day to various places with this trailer. When we are through using the vehicle as a trail-

Garford Five-Ton Truck and Trailer in Use at Enumclaw, Wash.-ington

This outfit is claimed capable of hauling as high as fifteen tons and averages about that amount each load.



truck itself would continue with its usual duties instead of waiting, and return in a few hours to haul the trailer back to the factory.

"We have found this delivery wagon trailer very satisfactory," said Clay Kahle, factory manager. "Our expense for both

er we hitch a horse to it and it performs its customary service as a delivery wagon. One of the main reasons for our using the trailer is the policy of our firm to render our customers excellent service. If we receive a hurry call from a merchant in an outlying district like South Park, Fauntley Park, Ballard Beach or Ravenna Park for additions to his stock we have the equipment to deliver the goods expediently."

The Supply Laundry Co. has recently placed a Warner auto trailer in service in conjunction with their Ford delivery car. In the month of April their expense on their Ford delivery car was as follows:

Gasoline	\$6.84
Tire expense60
Lubricating oil80
Grease16
Labor cost	4.40
Parts	5.07
Insurance	5.42
Total	\$28.89



Warner Auto Trailer Just Placed in Service by the Supply Laundry Company, Seattle, Wash.

Figuring their extra expense for the light trailer at 10 per cent., their operation cost will average \$31.78 per month. The trailer will be used more particularly in the paved



On the Job!

Nothing stronger could be said about any truck. And it is this feature of being "*always on the job*" that is the very backbone of SIGNAL success.

It is recognition of the fact that a truck pays a profit only when it's hauling—not when it is standing idle—that led to the wonderful simplicity of SIGNAL design and the quality of SIGNAL construction.

The SIGNAL Truck has the cleanest mechanism in the business. It's clean in two ways. *First*, it's clean because it's simple—not an unnecessary bolt or lug—no frills. *Second*, it's clean because every constructional unit—motors, transmission, axles, steering gear, frame, springs, wheels, tires, magneto—every unit is the best that can be built regardless of price or any other consideration—there's no room for suspicion that *any* feature *might* be better.

When you absorb that fact, you will have the secret and the backbone of SIGNAL success—and why SIGNAL sales are rolling up faster than ever.

Write at once for full details of the Signal line.

SIGNAL
Motor Truck Co.
DETROIT, MICHIGAN



districts where the population is congested and the calls close together. For this reason its operation expense will not be as high as if it were going upon rough unpaved roads in sparsely settled districts of the city.

The Hollywood Farm is using a 5-ton Troy trailer in conjunction with a White 5-ton truck between their city dairy headquarters in Seattle and their big model farm at Hollywood, Wash., twenty miles

consists of a 3½-ton General Electric truck, which is used in hauling a tar wagon, a grinder, and an electric welder to the places where the different construction gangs are working along the car tracks in the paved districts of Seattle. When loaded, the gross weight of the outfit, including the trailer, is ten tons. The company has kept accurate account of every cent expended in its operation and repair for 38½ months and the cost including tires, recharging of



An Old Delivery Wagon With Its Tongue Shortened, Used as a Trailer

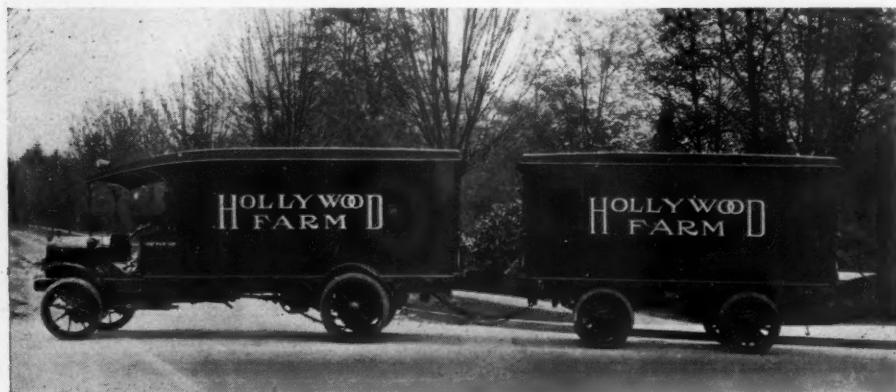
It is said to have been found very satisfactory in the service of the Crescent Manufacturing Company, Seattle, Wash. The operating cost, including the salary of the driver, is \$150 per month

away. This trailer is used to bring milk, cream, fruit and other farm products into the city and takes provisions and empty milk cans out once a day.

"We find that this combination of truck and trailer carries as high as twenty tons to a trip with a total expense of \$300 per month," said Harold Stimson, the manager. "This figure includes distillate which we use exclusively in the outfit with good results, as well as \$100 a month for a driver,

batteries, depreciation, insurance and tires has averaged 17 cents per mile.

The company also operates a four-wheeled trailer behind a 1½-ton White truck, which is equipped with a power winch. This combination is used to haul wooden poles to the various construction gangs in the city. Its operating cost averages \$6 per day. Another General Electric truck which is used by the company for hauling trailers has a capacity of two tons and an



Five-Ton Truck With Five-Ton Trailer

In service of the Hollywood Farm, Hollywood, Wash. Operation costs about \$300 a month, including \$100 for driver

grease, oil, depreciation, repairs, insurance and tires that are really our main expense with this outfit.

"We have found distillate very satisfactory with our big trucks and believe that we have saved nearly half on our fuel expense by using it. From our experience with the trailer thus far we are very well pleased and we figure that it will mean a saving in trips to and from the city."

The Puget Sound Light and Traction Co. has two trailers which they use in connection with their varied interests. One

average operating cost of 18½ cents per mile. These figures represent careful account kept for over three years.

The consensus of opinion is that the trailer is a powerful aid in securing greater efficiency for the company. A prominent official, who had made a study of the matter, said that trailers add only five per cent. to the actual cost of operation of their machines and greatly increase their efficiency.

Another business of the Northwest in which trailers are being used extensively

is the logging industry. The reasons for this are: First, the immense size of the pieces of timber which are often as large as nine feet in diameter; second, the excessive expense of building narrow gage railroads which are useless after the logs are cleared from the land; third, the truck and trailer can go from one camp to another and when the logs are all taken to the nearest railroad, waterway or mill, the trailer attachment may be removed and the truck may haul provisions to the lumber jacks or carry their personal effects from one place to another.

George Wooding has been operating a 5-ton Garford truck with a trailer in carrying logs from a logging camp near Auburn to the railroad at Enumclaw, four miles and a half away, under adverse conditions. In the first place the road passes through a swamp and in order to get through with a truck it was necessary to lay two 12 x 4-in. boards side by side in the soft boggy land so that the wheels of the outfit could rest upon them as they passed.

One of the features of this logging outfit modeled after the sledges of the North woods of Alaska and Canada are the cross chains which connect the trailer with the truck in such a way that the former follows the path of the wheels of the latter with such precision that the entire equipment can be turned around on this boarded path within a forty foot circle.

Another interesting feature of this logging outfit is the fact that the truck is fitted with a turn table or fifth wheel, which lies parallel to its floor. When this is turned the logs are jacked up and hoisted off the truck to a flat car or dropped into the waters of a lake or flume.

Inexpensive Operation

The expense of operation for this truck and trailer averages ten dollars a day. These figures include the driver's wages at \$3.50 per day, gasoline, oil, grease, insurance, tires and depreciation. The average load has been 4750 ft. of timber in lengths varying from 18 to 30 ft. The loggers figure 6 lb. to the average foot of lumber, so that a load of 5000 ft. would weigh 30,000 lb. or 15 tons.

The Garford truck and trailer have been very satisfactory to Mr. Wooding, their owner, who has just received the contract to haul logs in the Hoods Canal district of western Washington. He does this on a basis of a certain stipulated sum per thousand feet of timber. In order for him to make money on these contracts, he has to do the work in a very short period.

The Seattle factory of the Ford Motor Co. uses a light trailer in conjunction with their service cars in Seattle. It is used to carry tools and other equipment to various agencies and service stations. The extra expense of operation is very light and runs less than five per cent. of the total expense of operating the car.

Officials in all lines of business that use the motor truck are coming to the realization that the trailer is an important factor in getting the maximum of service from their commercial cars for they increase the weight of a load safely carried with a very slight increase in expense.



**ROSS
GEARS**

THIS CONTENTED DRIVER is only one of *sixty thousand* who go to their homes at night with light hearts and with untired muscles because the trucks that they drive are equipped with Ross Gears. With Ross Steering Gear, even the heaviest truck is surprisingly easy to control, and Ross quality in materials and workmanship gives an added assurance of safety and reliability. *Contented drivers* are one reason why Ross Gears are

The Steering Gears that Predominate on Motor Trucks

In view of the fact that one hundred and fifteen motor truck manufacturers, representing considerably over half the industry, are now using them as standard equipment, every man who buys a truck and every manufacturer owes it to himself to investigate and to demand the superior service guaranteed by Ross Steering Gears.

Write for Catalog and any Special Information desired

ROSS GEAR & TOOL COMPANY
760 Heath Street Lafayette, Indiana

THE TRAILMOBILE FOR MILITARY AND COMMERCIAL USE

Sechler & Co., Cincinnati, Ohio, are manufacturing a number of models of trailers that can be used for either military or commercial purposes. They can be drawn as trailers behind an automobile or used with mules. All the models contain the standard Trailmobile chassis except the ambulance body and the airplane carrier.

The standard Trailmobile chassis No. 2 is furnished with a pole for two mules if desired. It weighs 612 lb. and has a capacity of 1800 lb. The front axle is 1 $\frac{3}{4}$ -in. square bed and the rear is a 1 $\frac{1}{2}$ x 2 3-16-in. I-beam. The wheelbase is 62 in. and the tread is the standard 56-in. or 60-in. for southern territory. The tires are of the solid truck type, the front being 32 x 2 in. and the rear 32 x 2 $\frac{1}{2}$ in. The frame is steel angle section and all the cross members and spring hangers are hot riveted. Special heat-treated steel, semi-elliptic springs with rebound clips complete the chassis.

The army transport Trailmobile, No. 59; the tank, No. 110; the ambulance, No. 75; the airplane carrier, No. 72; the lance carrier, No. 62, and the military rolling kitchen, No. 111, are some of the models made by Sechler & Co.

The Military Rolling Kitchen

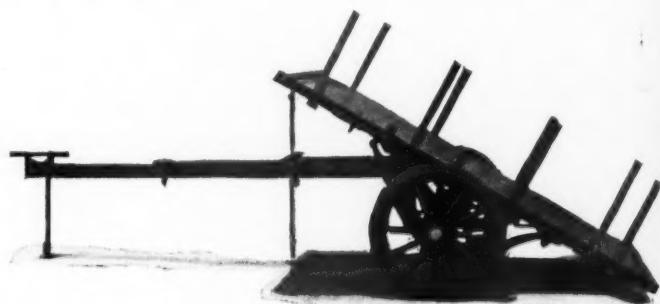
The activity of the military authorities makes the military rolling kitchen of special interest at this time. It is a trailmobile with a capacity for supplying 210 men. It is said to be a good heater, baker, boiler and roaster. An ample size tank under the wagon affords a supply of fresh water for drinking purposes and a hot water tank under the oven hold sufficient water for washing cooking utensils. There is a spacious compartment for storing merchandise and fuel and either wood or coal can be

burned in the stove. Seating capacity for those in charge of the kitchen is provided and the complete outfit can be coupled to a motor car or drawn by two mules. A paulin covers the entire kitchen and an extension frame enables this paulin to act as a tent for the cook. The range is made of two thicknesses of sheet steel, with asbestos between, making it safe and durable. The entire weight of this Trailmobile kitchen is 2000 lb.

LOS ANGELES UTILITY TRAILERS

The Los Angeles Trailer Co., Los Angeles, Cal., is offering a line of trailers to meet the demands of various industries. The Utility trailers, as they are called, have been adopted as standard equipment by numerous western concerns, among them

The Los Angeles Model B Dumping Trailer



being the Union Oil Co. of California, Pacific Telephone & Telegraph Co., Hammond Lumber Co. and the Whittier Water Co. They are warranted one year from date of shipment to purchaser to be free from defects in material and workmanship. One of the big features in several of the models is the dumping quality.

The dumping process consists of dropping the chain, which is shown on the front of the trailer, which binds the bed of the

trailer to the draw hole, rolling the load back until the bed of the trailer tips and the end of the lumber rests on the ground.

Specifications

Capacity—1 ton.

Dimensions—Inside stakes, 47 $\frac{1}{2}$ in. x 8 ft. Height of stakes, 22 in.

Body—Oregon pine flooring, hardwood stakes.

Frame—Angle steel.

Rollers—Three, 2-in. steel.

Springs—Semi-elliptic, 4 point suspension, 13 plate, underslung.

Spring Shackles—Cast steel.

Axle—1 $\frac{3}{4}$ in. square bed.

Bearings—Bower heavy duty roller.

Hubs—Malleable cast, extra heavy.

Wheels—Hickory, artillery type, 1 $\frac{3}{4}$ -in. spokes.

Tires—Press-on, motor truck type, 34 x 3 inches.

Draw Bar—Spring, type "B," shock absorbing.

Height—Floor of trailer 31 in.

Weight—1200 lb.

Painting—Chassis red; floor and stakes gray.

Correction: On page 60 of the June 15, 1917, issue of this magazine, in the description of the Walter Four-Wheel Drive Tractor it was inadvertently stated that the exclusive sales agency for this machine for the United States, was controlled by the Mercury Mfg. Co., of 4118 Halsted St., Chicago. The Mercury Company handles a portion only of the output. The caption beneath the illustration stated it was a Duplex, this being incorrect. The caption should have been "The Walter Four-Wheel Drive."

STEWART MOTOR CORP., Buffalo, N. Y., has added a 2-ton truck, known as Model 7, to its line. The new model sells for \$1975 f.o.b. Buffalo, with lead finish; \$20 extra for painting.

THE ROGERS BROTHERS CO., INC., of New York, who covers the Eastern States and the entire export field, has recently appointed Russell P. Taber, Inc., 128 Allyn Street, Hartford, Conn., as its distributor in five counties in the state of Connecticut, and has also appointed Blauvelt's Garage, Inc., of Spring Valley, New York, as its distributors in the territory of Orange and Rockland Counties and has recently closed several contracts in the export field covering part of Central and South America, Cuba and Russia.



Military Rolling Kitchen

A rear view of the Trailmobile kitchen and an illustration of the use of the extension frame of the paulin acting as a tent for the chef. This kitchen can be moved quickly and easily.

United States Tires Solid Truck



Your Truck Tire Profits

depend upon the demand for the truck tires you sell.

To make sure of your profits, stock **United States Truck Tires**,

— the tires that are popular because they wear longer and cost less in the end,

— the tires that are superior in quality, construction and finish,

— the tires that retain their 'kick' and stand up longer under any sort of punishment.

All of which is proved by the rapidly growing and enormous sales increases of United States Truck Tires.

Order them to-day.

United States Tire Company

1790 BROADWAY, NEW YORK

United States Tires
Are Good Tires

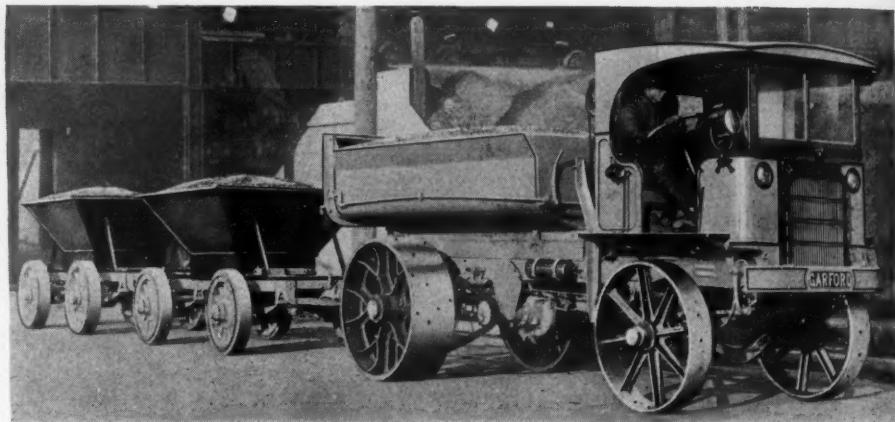


A Fruehauf Trailer Attached to a Packard Truck

Timken roller bearing axles, Timken bearings, artillery wheels and solid Firestone or Goodrich tires are used on these trailers. They are attached to the truck by means of a fifth wheel having a rocking motion to take care of the unevenness of roads. The Fruehauf Trailer Company, Detroit, Mich., produce these trailers.

The New Garford Road Builder

This outfit, announced by the Garford Motor Truck Company, of Lima, Ohio, is designed especially for building and maintaining roads of all kinds at a minimum cost. The body capacity of this truck is five cubic yards, which is equivalent to six tons. An important feature of the body construction is the regulation of the tailgate opening for the spreading of material to any desired thickness. The hydraulic hoist is controlled from the driver's seat. An automatic cut-out is provided at the extreme dumping angle.



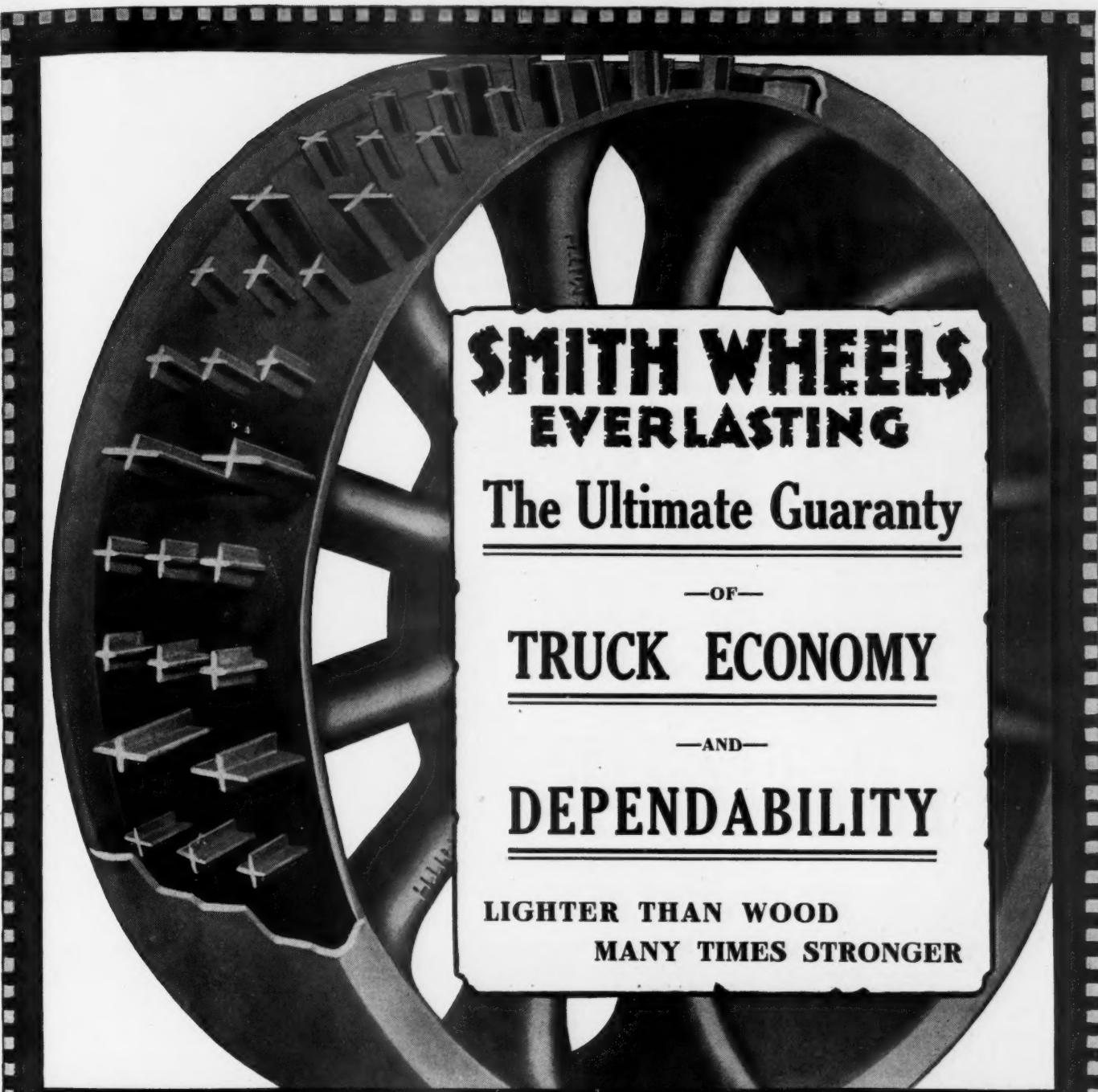
Republic Truck Doing Tractor Duty

Showing a Model T, three and a half ton Republic, made up especially for tractor work. It is not furnished as regular equipment. In this instance, it is fitted with a drawbar attachment, connected with a road grader. The heavy rear wheels on the truck, "Good Roads Wheels," are made by S. Fair & Son, of Saginaw, Mich. This wheel consists of a steel band, corrugated face, shrunk onto a regular Republic steel wheel. The face of the wheel is 16 in., and its weight is 600 lbs.



Trailer Doubles Capacity of Truck

The advantage of using a tractor is here well illustrated. By the use of the Troy model 212 reversible trailer and the Jeffery Quad truck, the latter is capable of hauling twice as much material as would be possible with the truck alone. The trailer's carrying capacity is from two to three tons. It is fitted with 4 in. tires. The outfit is used by Pierson & Brother, Incorporated, of Terra Haute, Ind.



What is the Biggest Item of Upkeep Cost? THE TIRES.

Smith Wheels have more than doubled Tire Mileage.

Aside from Chauffeur Hire, what is the Biggest Item of Operating Expense? COST OF GASOLINE.

Smith Wheels have increased the Gasoline Mileage of every truck equipped with them.

What has always been an Inevitable Source of Repair and Replacement Cost? THE WHEELS.

Smith Wheels Last Forever!

Smith Wheels guaranteed FOR LIFE OF TRUCK on which originally placed

SMITH WHEEL INC., SYRACUSE, N. Y., U. S. A.

"Electrics" and the Coal Crisis

By A. JACKSON MARSHALL, Secretary Electric Vehicle Section
of the N. E. L. A.

IN England during the early part of this year there were several weeks of extremely cold weather which exhausted the fuel in nearly all of the coal cellars, and caused a run on the merchants who supply poor customers with coal in small quantities. According to the London "Electric Vehicle" this coal shortage had not been anticipated, and while it was not, strictly speaking, a coal famine, there was such a scarcity of horses and men, that there were not ample means of transporting the coal to the users, thus causing considerable discomfort and misery. "Snow and frost produced a road surface which was as good as fatal to horses. Then began a most glorious scramble for hundredweights and even pounds of coal. Perambulators, hand-carts, taxicabs, and all sorts of things were pressed into service. It is easy to dismiss such a deplorable crisis with the remark that it was owing to the war. But it was not entirely owing to the war. The war merely showed up the weaknesses of a system which had come down from generations ago.

"A leading London coal merchant states that three journeys formed the average day's work of a man with a coal cart. Four journeys could be done if the man hustled; but with the contrariness of the independent workman, he was more inclined to do two instead of three or four, while every household was clamoring for deliveries.

"The maximum capacity of a coal cart is about two tons, so that the average performance of a horse and cart is six tons per day. The system of distribution is wasteful, because a horse and cart and a man have to be maintained for the transport of a few tons of material at a crawling pace for a mile or so.

"If, instead of depending upon horse traction, we had been provided with mechanically-propelled vehicles of much larger capacity, the coal famine would never have occurred. To anyone who argues that we should have been almost as badly off with petrol wagons, because of the restrictions on petrol, the lack of skilled drivers, and the difficulty of running heavy petrol wagons on ice-bound roads we would offer no denial.

"The conditions are, in fact, eminently suited to electric haulage. No power is used except when the vehicle is running; skilled drivers are not required, so that the carter can be driver as well; and the vehicle is ready for the road at any time under all conditions of surface. The limited radius of delivery—a feature which tells against the economical use of petrol or steam wagons—is favorable for the most economical use of battery vehicles."

Electric trucks have already been used in England for the transportation of coal from depots to electric power stations and to other large users. A three-ton electric

coal truck used by a Glasgow Co-operative Society works 307 days out of 865, and was out of commission only one after noon and the following morning during one entire year, thus attaining a reliability coefficient of 99.65 per cent.

The value of the electric truck for coal delivery has been appreciated in this country for a number of years, and especially in New England where there are many large fleets in operation. A novel electric coal truck is used by the Bay State Fuel Company of Boston. It is a five-ton truck with a body which can be hoisted on four heavy screw pins, and is adjustable to any height up to its limit of

39 in., so that the coal can be conveyed by chute not only across the sidewalk but across the average lawn. All operations, lifting or lowering, are controlled from the driver's seat, and the two horsepower motor located in the rear of the chassis for this purpose is able to lift 5½ tons of coal in 1½ minutes, using only 26 amperes of current. The body may be lowered in one minute.

Just at this time the fact that a great number of truck drivers will be drafted for services abroad, the possibility of many horses being commandeered, and the increasing scarcity of gasoline makes it advisable for the coal dealer to carefully consider his transportation facilities for the coming year. Should women drivers be employed to any great extent, the electric truck would be the natural means of transportation to adopt, because of its extreme simplicity of operation.



Special Ambulance Body

Mounted on a Reo chassis; capacity, three patients. The interior is white enamel, cots have white leather upholstery. Medicine cabinet furnished, also dome light and stretchers. It is 45 x 90 in., and 60 in. high. Price, \$1200. Made by the Champion Wagon Company, Incorporated, of Oswego, N.Y.



GMC Truck With Special Dumping Body

Used by the Puget Mill Company, Seattle, Wash., for hauling pieces of wood and odd cuttings from its lumber mill. The dumping body is wood, and is upset by winch-operated cables.



This

ATTERBURY

MAKES 150 MILES EVERY DAY

With the letter shown below, and with hundreds of others like it,—could you sell the Atterbury?

Would the Atterbury stay sold? Would each Atterbury sell another Atterbury for you?

Those are foolish questions to ask of any man who knows anything about the truck business. Think it over! These are not mere claims—these are documentary facts.

Hadn't you
better wire the
Atterbury for
their dealer-
ship prop-
osition?

**Atterbury Motor
Car Company**
Buffalo, N. Y.

JBD/B

Yours very truly,
COLLINS BAKER

When Writing, Please Say—"Saw Your Ad. in the CCJ"

The Automobile Affects Food Conservation

Less Acres in Horse Fodder and More in Food for People

By O. P. AUSTIN*

THE announcement that grains suitable for human food will no longer be fed to horses in Great Britain calls attention to the possibilities of gradually enlarging the production of the world's food supplies by utilizing for that purpose the vast areas now devoted to producing grain for horses, for which the world is rapidly substituting power-driven vehicles and cultivators.

A compilation by the National City Bank of New York shows that this process of substituting the motor for the horse on highways and farms has already made rapid progress in the United States. The number of horses on farms in the United States in 1917 is no greater than in 1910, while population has meantime increased 13 per cent., and those changes do not include the horses in cities, where the substitution of power-driven vehicles for those drawn by horses is even greater than on the farm. The total number of horses in the entire United States in 1917, including farms and cities, is probably less than in 1910, while population to be fed has increased 13 per cent.

Meantime the transfer of production from oats, chiefly used as food for horses, to that of wheat as food for man, seems to have made even more rapid progress. The number of acres devoted to the production of oats in 1916 showed an increase of less than 11 per cent. over that of 1910, while the acreage devoted to wheat in 1916 showed an increase of 27 per cent. over that of 1910, corn also showing an increase, though not as great as that of wheat.

During the 1910-1917 period, in which the horses in the country showed a slight decline, and the acreage devoted to the production of their food showed a less gain than that of food for man, the production of petroleum used as food for the road and farm machinery taking the place of horses shows an enormous increase. The quantity of petroleum produced in the United States was in 1910 8,801,000,000 gal., and in 1916 12,264,000,000 gal., an increase of approximately 50 per cent.

Meantime there has been an enormous growth in the number of power-driven road and farm vehicles and tractors, the census of 1916 showing over \$500,000,000 worth of automobiles produced in 1914 against a production of less than \$200,000,000 worth shown by the census of 1910. Of farm tractors the statistics, while incomplete, are sufficient to show plainly that they are now performing much service, for which the farmer was formerly dependent upon the grain-consuming horses. A recent statement by the Department of Agriculture shows as a partial census of tractors in the United States 34,371 actually in com-

mission, and representing every State of the Union. Very recent reports indicate large numbers of farming tractors being purchased for community uses, and a single manufacturing concern in Ohio reports contracts for agricultural tractors aggregating at present \$15,000,000, with prospects of \$50,000,000 during the year.

Figures of world production of the various cereals indicate that the substitution of petroleum-fed power machines for the grain-fed horse could also materially increase in other countries the area available for production of food for man. The area devoted to the production of oats, chiefly food for horses, aggregates for all countries, for which figures are available, about 140 million acres, wheat 280 millions, corn

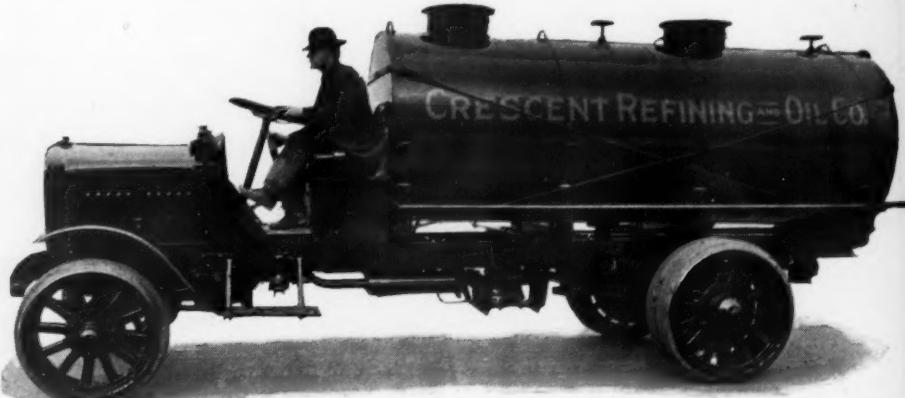
170 millions, rice 140 millions, rye 100 millions. World production in normal years is, in very round terms, oats approximately 4½ billion bushels, wheat 4 billions, corn 4 billions, rice 5 billions, rye 2 billions and barley 1½ billions. In the United States where oats and wheat grow side by side on lands capable of producing either grain, the area devoted to oats was, in 1915, the banner crop year, 41 million acres, and to wheat, 60 million acres, suggesting that the gradual substitution of the petroleum-fed roadster and farm implement for the grain-fed horses, as the present generation of horses passes out of existence, might largely increase the wheat-producing area, while a similar substitution might follow in other parts of the world, as a whole, in which the area devoted to the production of oats is about one-half as great as that devoted to wheat.

Meantime world production of that substitute for horsepower on roads and farms, petroleum, is increasing with remarkable speed, the total world production of petroleum having grown from 150 million barrels in 1900 to 328 millions in 1910, and 430 millions in 1915.

ADVANCED TYPE FUEL-OIL CARRIER

The demands of special industrial use are putting a premium on engineering ability as an adjunct to salesmanship and service, as qualifications for dealer success. A good instance of recent occurrence is the engineering skill and practical inventiveness embodied in a special oil carrying truck designed for the Crescent Refining and Oil Co., of Los Angeles. This truck for one thing is noteworthy for the welded

gallons a minute against a 32-ft. lift. Valve controls permit of the use of the pump for filling the tank of its own or another truck from a tank or sump, or emptying its own or another truck's tank. Where fuel oil is to be delivered to an installation feeding boilers by gravity this truck presents decided service and getaway advantages. Formerly hand pumps on the premises were used, representing a cost to the buyer, and through slowing the delivery, likewise to the seller of oil. Where the receiving tank



Fuel-Oil Carrier Developed by the Southern California G M C Distributors

tank, built by Lacy Iron Works, under the direction of D. H. Jaques, in charge of truck sales in the Leach Motor Car Co., southern California G. M. C. distributors. This welded job gets rid of the excess weight of overlaps necessary for riveting, and all rivets. The mounting of the pump is also original, and interesting from the standpoint of appearance and weight elimination. This is a standard Gould pump, but the base was cut down.

The pump drive is controlled from the driver's seat. Power is taken from the engine through a connection back of the transmission. The pump will throw 200

is low, as in many buildings, gravity delivery is employed. Outlets are respectively 4 and 2½ in. in diameter for gravity and pump delivery, giving quick service under either condition. The tank has a capacity of 36 barrels of oil, in two compartments. It is mounted on a standard Model 101 G. M. C. chassis, worm drive.

RAINIER MOTOR CORP. OF NEW YORK has secured an order for a fleet of 27 ½-ton Rainier trucks from the Navy Department. They will be distributed to the various naval training stations throughout the country.

*Statistician, the National City Bank of New York.

POACK TYRES

FULFILL
THE
REAL
TYRE
PURPOSE

10,000 MILES
GUARANTEE
INvariably
EXCEEDED,

Somewhere in France---
between the Road
and the Load---
Polack European Standard
Tires are "doing their bit"

INTRODUCING THE NEW WORM DRIVE LINE OF **SANFORD** MOTOR TRUCKS



ACKED by an organization that knows no limitations in producing the best line of motor trucks that men, money, materials, recognized modern manufacturing methods, and engineering brains can build.

We do not claim that the Sanford Truck is going to be the greatest whirlwind seller within a few months since the introducing of motor-propelled hauling equipment.

We do not claim that the dealer will corner the market or that he will become independent overnight.

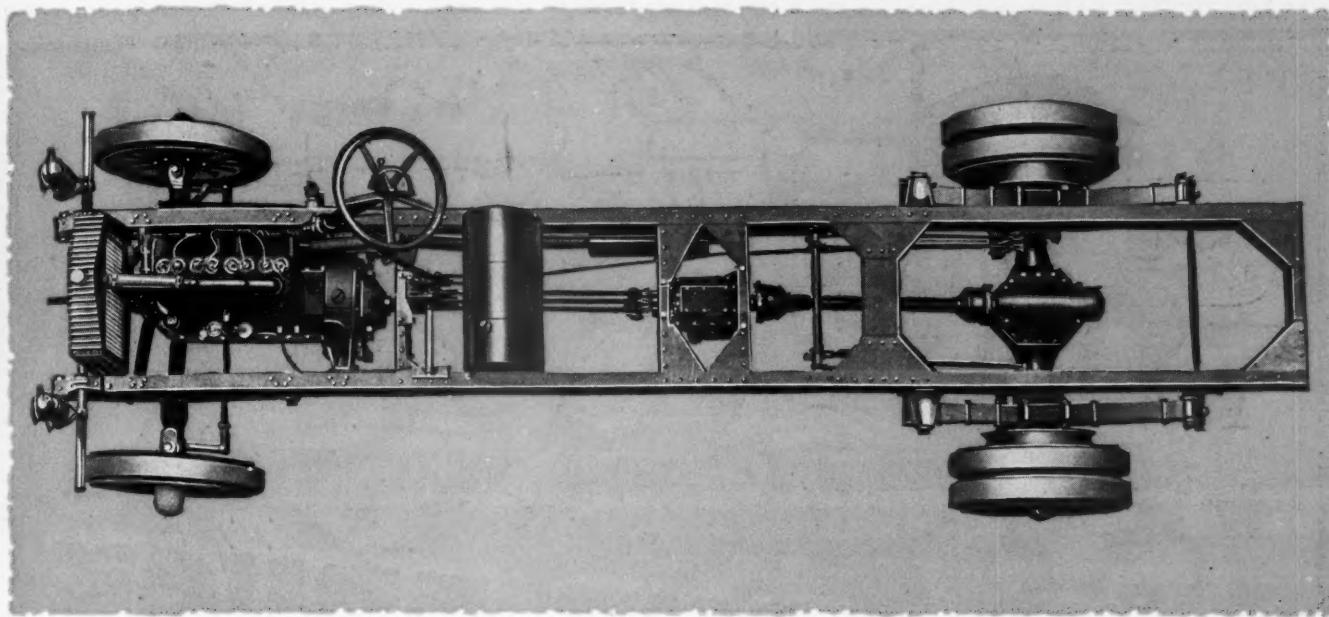
We claim merely that any live, energetic, up-to-snuff dealer with a stiff backbone and an opportunity of demonstrating, point for point, the big features of the Sanford Truck, will joy in the battle of competition, knowing he is fighting a winning fight.

We have a proposition for such dealers—a proposition gilt-edged, broad, profit-producing. The radius of each dealer's territory will depend wholly upon his ability to properly swing it and show his worthiness. Then he'll get the territory and the protection he's entitled to.

Send for our plan *today*. Ask for the Sanford Truck specifications and complete details of this sturdy equipment. The right men will have one of the best opportunities in the trade today. Deliveries are assured.

**2½-ton, 3½-ton, 5-ton Worm Drive
1-ton and 2-ton Internal Gear Drive**





Specifications

Model "35" 3½-ton Sanford Truck

Capacity—Normal load, 7,000 lbs. Maximum permissible weight on rear tires, 12,000 lbs.; on front tires, 4,700 lbs.

Speed—Motor governed to maximum speed of 1,100 r. p. m., giving a truck-speed of 13 miles an hour on high gear.

Chassis—Standard length of wheel base, 174". Chassis length back of seat, 12". Chassis frame width over all, 35".

Standard Equipment—Side and tail lights, mechanical horn, tool box and kit, jack, oil can.

Cab—Full cab furnished as regular equipment, equipped with complete set of storm curtains.

Motor—Mounted in front under hood. "L" head type, four cylinders, $4\frac{1}{2}'' \times 6''$, cast en bloc. Three point suspension. Develops $37\frac{1}{2}$ h. p. at 1,000 r.p.m. Mounted so as to be readily accessible without removing from frame. Ignition, high tension magneto. Carburetor, $1\frac{1}{2}''$ side outlet. Lubrication, geared pump, force feed system. Cooling, centrifugal water pump. Fan, steel construction; belt tension adjustment.

Clutch—Borg & Beck three-plate dry disc clutch of large diameter, attached to fly wheel of motor and entirely enclosed by cast iron housing attached to bell housing of motor.

Transmission—Four speeds forward and one reverse, with maximum reduction on low gear of approximately 5-1. Intermediate speeds arranged in geometrical ratio. Connection between transmission and rear axle shafts by means of two Spicer Universal Joints with tubular drive shaft.

and splined slip joint. Universal Joints provided with grease covers to insure proper lubrication at all times and prevent dirt and dust from working into bearings. Gear shift lever mounted in center and gears are operated on selective principle. Fourth speed is direct drive.

Springs—Semi-elliptic, front and rear, full alloy steel properly heat-treated. All spring eyes bronze bushed. Front springs 3" wide, 46" long; rear springs $3\frac{1}{2}''$ wide, 54" long. Special type of spring hanging provided on rear springs.

Wheels—Heavy artillery type with spokes mounted centrally in felloe. Front spokes $2\frac{1}{2}''$ square, rear spokes 3" square. Rear wheels special construction preventing water or dirt from working between spoke and felloe. Fourteen spokes in both front and rear wheels.

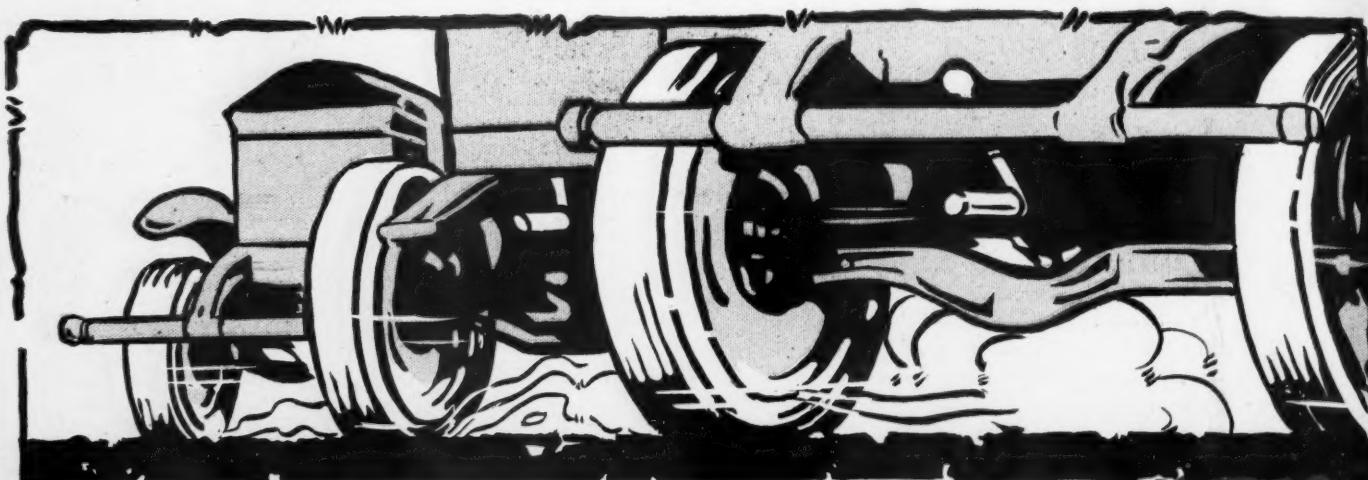
Brakes—Emergency and service brakes mounted on rear wheels. Both brakes internal toggle wrap-up type. $2\frac{1}{2}''$ wide, 20" in diameter. Brakes enclosed, protecting them from oil and grit and prolonging the life of lining.

Drive—Worm drive, made by Sheldon Axle & Spring Co.

Frame—Pressed steel; side channels 8" deep, 3" top and bottom flange, $\frac{1}{4}''$ stock, made from special frame dies. Pressed steel cross members used at points where rigidity in frame is desired.

Tires—Standard equipment; front 36 x 5, single, solid; rear, 36 x 5, dual, solid. Tread, center to center of front wheels, 62"; tread, center to center of rear wheels, 66".

SANFORD MOTOR TRUCK COMPANY
100 St. Marks Avenue - - - - - Syracuse, N. Y.



KEEP YOUR TRUCK FLEET ON ITS FEET

But don't think for a solitary minute that because it *is* "on its feet" you are footing the minimum cost of operation.

A truck may stay in constant service, still be a "drag" and cause an excessive drain on your expense account.

Get down to "hard pan" of profitable trucking. Estimate "income" by what you put *into* your trucks, as well as what you get *out* of them. The

New Stromberg Carburetor Especially Designed for Trucks

develops greatest hauling power—greatest strength—and does it at a tremendous saving over cost of inefficient service.

Briefly—the New Stromberg eliminates the big percentage of lay-offs. This means more service—more money for service rendered—at least possible cost of time, trouble and cash.

41% of All Listed Truck Models

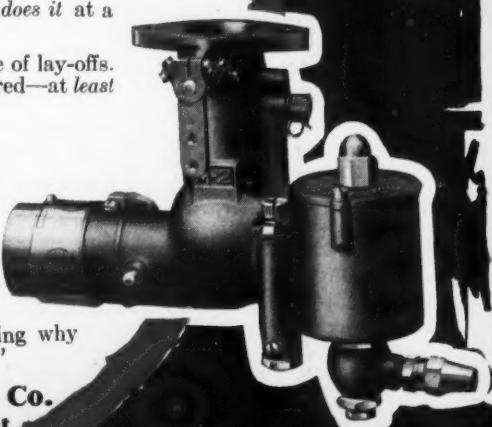
are now Stromberg equipped for no other earthly reason than because of demonstrated dollars and cents savings and more satisfactory service.

Test it on our liberal

30 Day Money Back Trial

Send now for Descriptive matter explaining why
"The New Stromberg Carburetor Does It!"

Stromberg Motor Devices Co.
Dept. 736 64 E. 25th Street
Chicago, Ill.



New STROMBERG Does it! CARBURETOR

When Writing, Please Say—"Saw Your Ad. in the CCJ"

Selling Motor Trucks

By ALLING PARKHURST*

THE qualifications of the present day motor truck salesman are many and varied. In the first place, his middle name must be "patience," for he certainly needs every bit of it he can command with abundance of tact and resourcefulness thrown in. I have seen men, who had plenty of patience and who were very resourceful, yet at the same time were lacking in tact to such an extent that they were virtually "thrown out" of the office of what might have been a real prospect.

The average business man, who can and will some day use motor trucks where their application warrants their use, is really interested in a proposition which will save him money, but is invariably a very much preoccupied individual. The problem, then, is how best to approach him to present the proposition, without in any way presuming to take up his very valuable time. Having once said "no" he may look upon the salesman as a pest, when he calls again, although in the long run he may be one of his best "Class A" prospects. Either the salesman failed to make the necessary impression or did not "get home" his clinching arguments on his previous call. Here is where patience, resourcefulness and tact, which I consider prime requisites, must all be brought keenly into play.

It is with conflicting emotions that I mention other qualifications of the man "on the firing line" who keeps the motor truck factory busy. The writer's somewhat limited experience in the selling end of the motor truck field has been confined entirely to the electric. Let me say right here, and other electric truck sales managers will vouch for it, that this particular "breed" is undoubtedly one of the most difficult articles to convince the average business man that he really needs, and that it will save him real money. And yet, after he has put one or more in service, it is invariably followed by repeat orders resulting ultimately in "fleets."

I have known men, who lacked the knowledge and technique of the truck business, who had no conception of the engineering principles of motor truck construction, yet who could "put across" order after order by the sheer force of their personality. However, these men are rare and they soon pass on to higher executive positions. A good working knowledge of motor truck construction, and, in the electric truck field, a knowledge of the principles of electricity, are, to the writer's mind, essential to the motor truck salesman. A successful salesman usually is a student of transportation problems, so that he can, at least, roughly estimate the cost of operating a motor truck in ordinary service. He should be able to tell a pros-

pective purchaser, after studying his particular transportation conditions, if the truck he is offering will or will not do certain work and he should frankly admit its unsuitability if such appears to be the case.

The writer would invite discussion of a number of problems which sometimes have caused no little difficulty in handling salesmen or agents. Here are some of them:

1. *Holding salesmen to standard chassis construction* and avoiding special features which sometimes result in a loss. You know how you are coming out, when the salesman cuts the price on standard construction, but you don't always know how much special chassis construction is going to cost.

2. *The question of used-car "trade-ins."* A second-hand, frequently obsolete truck, invariably costs more in the way of selling expense than a new truck. The purchaser of second-hand trucks usually insists on some sort of a warranty which is practically impossible. Result: scrap heap, junk man, loss.

3. *The advisability of giving demonstrations.* This is one thing, which to the writer's mind, can result in the greatest single item of selling expense, unless properly handled and yet can be employed to absolute advantage in clinching a sale. It is a question of "sizing up" the prospect and leaving the matter to the integrity of the salesman. I have advocated a policy of a one-day demonstration in some cases free of charge to the prospective purchaser with a regular daily rental charge, if it is required for subsequent days. I believe demonstrations should only be made, to determine some unknown factors in a particular service or to prove certain claims made for the truck to the prospective purchaser, and should never be made unless the prospect is ready and willing to place his order when the claim has been proved by this means. I know one successful company which always puts this matter squarely up to the prospect and insists on getting his assurance before offering a demonstration. Rendering new trucks second-hand by using them for demonstrations with the expenses of the wear on tires, power, etc., is an expensive process and is a serious problem for the truck manufacturer.

4. *Getting salesman to hold to prices* and regular terms of payment has always been a problem. There are, however, a number of companies that will purchase commercial negotiable paper which has considerably reduced the problem of terms of payment. Under the present conditions of the raw material market with the ever increasing prices of the iron, steel and copper trade, the problem of holding firmly to prices established to meet these increases has become very serious. Competition, of course, has a very large bear-

ing on this. The writer has advocated a policy of determining a salesman's commission on the basis of a sliding scale depending on the price at which the order was secured. As the price depends primarily on the number of trucks ordered, this is very carefully taken into consideration in arriving at the commission paid. The result has been that this has the effect of "bolstering up" the salesman to stand more firmly on his price. A prospect, in the form of a shrewd purchasing agent, becomes very wily when the salesman offers him a reduction on the price originally quoted. The writer has always advocated the policy of "standing pat" on the original quotation, making the price based on a certain cost with a reasonable manufacturer's profit.

5. *Relation of service and sales departments.* Once having obtained the confidence of a truck user by selling him one or more trucks it is essential to retain that confidence, which is a very valuable asset, by rendering him the necessary service to keep his truck paying for itself. The writer believes, therefore, that the service department should be under the direction of the sales department. The questions of policy and diplomacy can best be handled under the direction of the sales department, because it established the original connections and is familiar with the conditions and (if you will), eccentricities of the purchaser. Furthermore, by this means the sales department always has "its fingers on the pulse" when additional trucks are needed, while at the same time it is brought directly in contact with the men in the operating end of any business who frequently can make things "look black" unless they are handled properly. The human element is still a big factor in the motor truck business and in reality a driver of a motor truck can make it efficient or appear inefficient if he so elects.

SELECTING SALESMEN]

By J. H. STEVENS*

In selecting salesmen I am guided by the character of the man more than by his past performances. My men must impress me with their plain, unequivocal, direct, sincere honesty; this with a good store of common sense and energy makes a good salesman for motor trucks.

We teach our men to sell service and not simply machines.

The sale of "machines" simply, without regard to their adaptability to the customer's requirements, and the neglect of the machine and customer after the sale, I believe to be the greatest evil of the trade today.

* Sales Manager, Forschler Motor Truck Mfg. Co., Inc.

* Assistant General Manager, Atlantic Electric Vehicle Co.

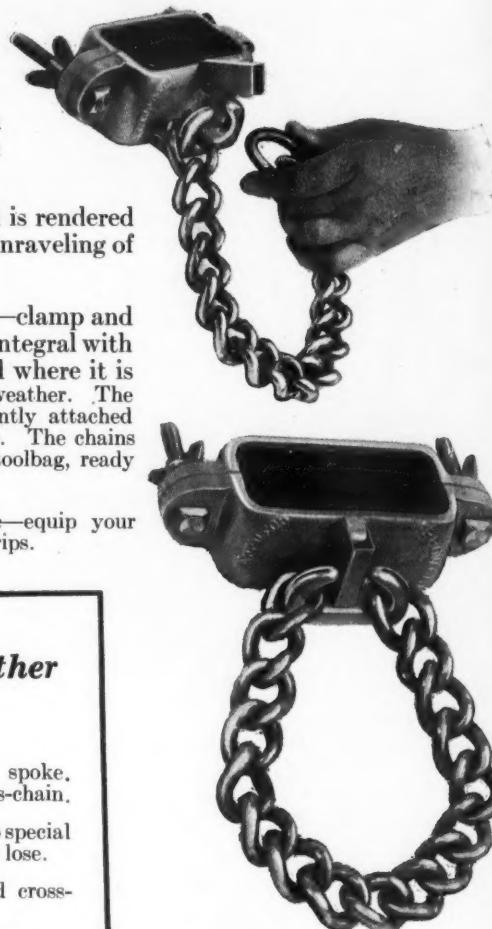
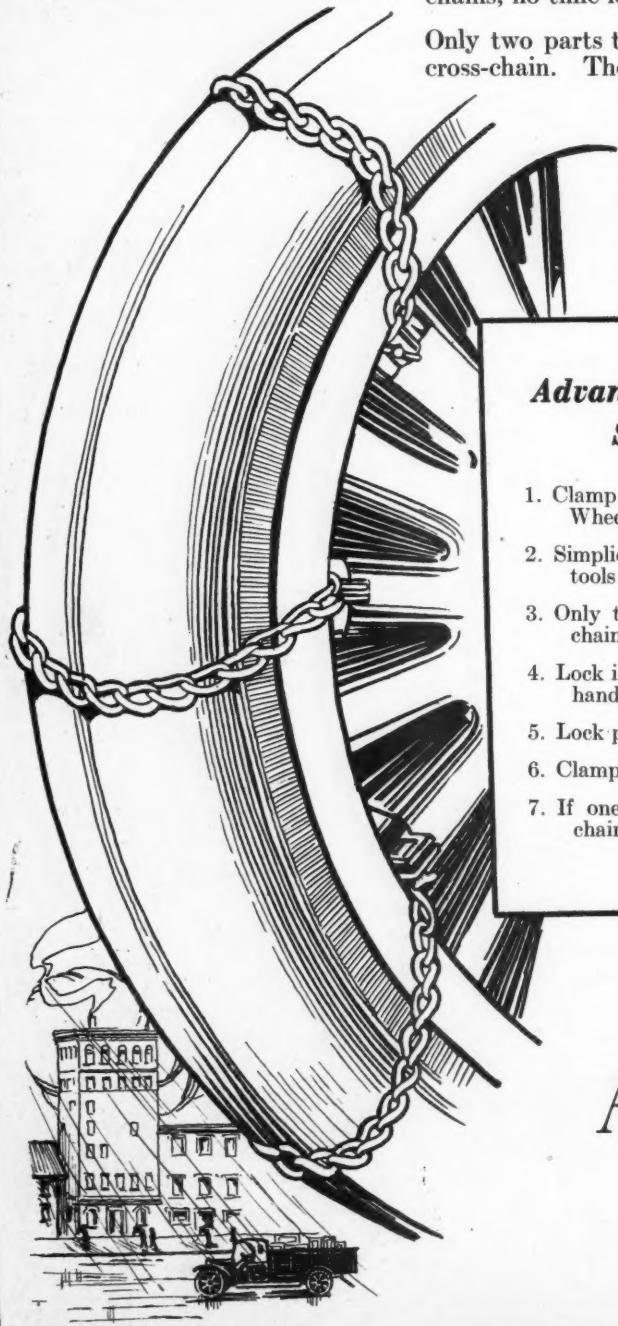
Your Driver Will Appreciate the Protection of ARROW GRIP CHAINS

On the skiddy, slippery road—when the sudden storm appears—then your driver will appreciate the simplicity, the certainty, the protection of Arrow-Grip Chains.

All he needs to do is to attach the chain to the clamps and the wheel is rendered skid-proof and accident-proof. No need to jack up the truck, no unraveling of chains, no time lost.

Only two parts to the Arrow-Grip—clamp and cross-chain. The locking device is integral with clamp, yet located where it is not exposed to the weather. The clamps are permanently attached to every other spoke. The chains are carried in the toolbag, ready for instant use.

Quick, simple, sure—equip your truck with Arrow-Grips.



Advantages Over Other Skid Devices

1. Clamp attached firmly to spoke. Wheels cannot spin in cross-chain.
2. Simplicity of attachment, no special tools necessary, nothing to lose.
3. Only two parts—clamp and cross-chain.
4. Lock integral with clamp—only one hand needed to open or close.
5. Lock protected from weather.
6. Clamps 100% overstrength.
7. If one chain should break, other chains still furnish protection.

Arrow-Grip Clamps conform to army specifications. When ordering give name and capacity of truck.

Write for prices and literature.

Arrow-Grip Mfg. Co.
Glens Falls, N. Y.

THE PUBLISHERS' PERSONAL PAGE

Hard work and optimism keep business booming

What Has Become of the Calamity Howler?

AFTER four months of war, there is more activity and prosperity in this country than ever before. That most all lines of trade have been prosperous is shown by that best barometer of business conditions—the automobile market.

A further indication that the prophecies of a slump after a declaration of war, have failed to come true, is the fact that never in the nation's annals has there been such a small proportion of people out of work. Everyone who has tried to get help of any kind in the last few months can bear testimony to this. And as a natural consequence of this condition the scale of wages is the highest we have known.

Be Prepared for Peace

Some keen analyst, a little time ago, speaking from the business and not the military viewpoint, reversed the familiar adage, making it, "In time of war prepare for peace." This is indeed sage advice. Nevertheless, on the "safety first" principle, we must act, talk and think that the nation is in for a long, hard war, to make every last one of us alive to the fact that we *are* at war (which, unfortunately, is not fully realized at present). This, however, need not prevent our planning so as to be ready to adjust

• Table • of • Contents •

	Page
Advertisers' Index	215
Accessories and Appliances	33
"Business is Good, Thanks"—By Harter B. Hull	64
Editorials	13
Factory News	21
Freight Congestion Emphasizes Motor Truck Value	65
Government's Military Truck Program, The—By Capt. Wm. M. Britton	7
How Military Truck Standardization Started—By Coker F. Clarkson	5
Motor Trucks Gaining Friends	11
National Automobile Dealers' Association—By George Brown	17
New Commercial Cars	42
New Truck Agencies	21
Personals	21
Reducing Delivery Costs a Patriotic Duty—By Ida M. Tarbell	16
Tanks, Tents and Trenches—By George Brown	12
The American Opportunity in Russia—By Henry W. Wesener	64
The Horse, and the Food Crisis—By A. Jackson Marshall	62
The Standard Military Truck Problem Solved	3
Tractor Department	23
Tractor Owner Plows for Others at a Profit	23
Trailer Department	50
The Trailer in City Garden Work	50

ourselves to the sudden and tremendous changes that will come when the war is over.

There will be a greatly reduced demand for some things, but this will be more than offset by a greatly increased demand for others, when peaceful pursuits are resumed. Our foreign trade will far transcend the greatest we have previously had, principally in the necessities of life—food, clothing and

fuel supplies—for then, not only our allies, but our erstwhile enemies, must look to us for the things that they have lost the ability to provide for themselves in needful quantities while their every effort has been bent on the waging of war.

Good Business to Continue

War or peace, business is bound to continue at a high peak for years to come, but there will be worry and hardship aplenty for those who are not alert and ready to adapt themselves to the sudden change.

We must have greater efficiency in our working and living. That is the great lesson we must learn from our foes, for without efficiency they could not have endured in the conflict thus far, and it has been efficiency at home as well as at the front that has counted.

But to be a wise patriot it is necessary to be an optimist, and one can easily be both since our four months of war has proved that the calamity howler was both unpatriotic and wrong. The way to win the war is to believe in the future of our country, work hard, and be optimistic. If you meet any calamity howlers, show them the error of their ways.



Endorse Autocar After Six Years' Use

Olds & Whipple of 164 State Street, Hartford, Conn., say: "We have been using Autocars for the last six years and are well satisfied with results, as we are getting good mileage on tires, also gasoline consumption, and can recommend same as having plenty of power and speed for a truck."

Write for illustrated catalog and list of more than 4500 concerns using Autocars in every line of business

THE AUTOCAR COMPANY
ARDMORE, PA.

Established 1897

MOTOR DELIVERY CAR SPECIALISTS